The Chemical Age

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The British Association Meeting

SIR JOSIAH STAMP, who has recently been concerned in the creation of a new research department of considerable magnitude in connection with the railway with which he is associated, cannot be accused of any lukewarmness towards scientific research. Nevertheless in his presidential address he follows the lead of other presidents of the British Association in voicing a feeling that all is not well. The achievements of science during the last hundred years have, fortunately, produced no spirit of complacence and the general note of many of the presidential addresses has been one of uncertainty and disillusionment. The march of scientific discovery has brought with it a fundamental change in human relationships and in methods of earning a living. Already the characters of Dickens seem to belong to a world that has passed away, their outlook on life utterly different from ours, their ways of supporting life and their slavish obedience to employers incredible.

To-day a whole coalfield will strike if one man is not, in the opinion of his fellows, accorded his full rights. Only a hundred years ago colliers were subjected to incredible punishments for trifling faults; we read that "the refractory collier had an iron collar placed round his neck by which he was fastened to the side of an underground roadway," or that in other instances he was brought to the surface where, by tying his hands in front of the horses, he was compelled to run backwards, but in front of the horses, round the track when, if he did not move fast enough, he was trampled on, and again when two or three were to be punished together, the horse was taken out and the men "compelled to draw the gin at the crack of the whip, while the horses stood looking on." The change in social conditions during the lifetime of the British Association is to be placed to the credit of scientific discovery and invention. That, however, is only part of the picture.

He recognises the rapidity of the advance of science. This rapidity is reflected in the change that has come upon us during the lifetime of even the middle-aged; where were the motor-car, the aeroplane, wireless and even the telephone fifty years ago? Already we can see greater wonders for to-morrow. The pace of science is accelerating, and the pace of industrial development is accelerating. Look back upon the history of the great industrialised discoveries of the nineteenth century and we perceive a difference between the method of development then and now. The method of those days was individualistic, the pioneering of the backwoodsman who must find his home, clear away the forest for himself and unaided establish himself by his own efforts. The individualistic method necessitated a time-lag between discovery and complete exploitation. To-day, even though research may still be individual, exploitation is the work of a team. Capital seems easier to obtain, and once an idea has progressed but a little way, capitalists take it up, put on teams of research workers and development engineers, high-pressure salesmen play their part and the public is, within a few months from the date of the first discovery, in full enjoyment of yet another so-called "amenity."

Sir Josiah rightly rejects the view that science causes unemployment and—as we have often done in these columns—lays stress upon the "work-creating" aspect of scientific discovery. He perforce agrees that the great stabilising factor of the nineteenth century, increase of population, accompanied by territorial expansion, has now ceased to function for the majority of the white races; the total demand for new goods is becoming static and the number of new industrial entrants is decreasing.

Sir Josiah Stamp is to be congratulated upon facing the fact that the rapid and still accelerating march of science has produced immense economic and social difficulties. He is also to be congratulated on not having taken the easy way out and suggested that a brake should be put upon scientific research. But he does not suggest how the difficulty is to be overcome—how human beings are to adjust themselves to their changed conditions. Those chemists and industrialists who are accustomed to look away from their immediate tasks to endeavour to ascertain whither we are going, know full well the facts that Sir Josiah Stamp has put before the Association; what they do not see any more than he does is the solution of the problem. We agree that "ordered knowledge and principles are wanted at every point" and that some means must be found, internationally, of increasing the pliability of human and political institutions before the pressure of scientific development. Progress is prevented by the static qualities of human mentality, the innate dislike of change and inability to strike away from the ordered path. Progress is also prevented by out-of-date systems and by Government interference with markets under the impulse of antiquated doctrines—though it is difficult to decide when an established economic doctrine has become antiquated, and a mistake in that direction may cause untold suffering and privations in the economic field. Sir Josiah believes that we must advance the science of man equally with our advances in the science of matter. Material science must not be retarded; social science must be accelerated. Brave words; who will translate them into action? And by what means?

Notes and Comments

Chemical Trade Returns

BRITISH exports of chemicals, drugs, dyes and colours for the first eight months of this year, totalling £13,692,242, showed a decrease of £149,977 compared with the corresponding period of 1935. But for the unsettled conditions in Spain and Italy, however, the Board of Trade returns might have revealed an encouraging increase. For Italy alone the decrease was £145,995, and for Spain the decrease was £137,381. Fourteen of the remaining nineteen countries mentioned in the returns actually took more British chemical products than a year ago. A highly satisfactory feature is the increase in dyestuffs exports from £963,800 to £1,023,500, while other products showing increases were coal-tar products, salt, proprietary medicines and paints. On the other hand, sulphate of ammonia, copper sulphate, disinfectants, sodium carbonate and caustic soda each recorded a decrease. Chemical imports for the eight months at £7,974,913 were £785,597 higher than in the first eight months of last year, the principal increases being from Germany (£368,417) and the United States (233,071). Dyestuffs imports rose from £732,043 to £985,087, and carbon blacks from £354,665 to £433,643. Taken as a whole, the trend of trade is encouraging. Total British exports have been higher by nearly five and a half millions than in the same period of 1935, which was a year of great advance. This improvement was made in spite of a fall of two and a quarter millions in coal exports, due mainly to the cessation of Italian purchases. All but six of the twenty trade categories have increased their exports this year.

Loans to Private Industry

THE suggestion put forward by Mr. John Benn in his recent letter to *The Times* that, as part of the solution of the problem of the distressed areas, the younger executives at present occupying junior positions on the boards of successful companies in the South should be enlisted by the Government to start new factories with the help of subsidies, has provoked a good deal of discussion. Industrialists hitherto have not acted independently in sufficient numbers, partly because their domestic ties are in the South and partly because of the risk involved (through lack of unskilled labour, for example) in branching out in special areas. Does a demand, in fact, exist for loans to private industry? Would there be a response if the Treasury offered to put up the debenture capital for, say, a new chemical factory, to be run by a private firm, subject to certain safeguards which might be necessary in lending public money? The Special Commissioners are at present barred from assisting enterprises "operating for profit," and if the Government were to remove this condition, it would have to be pretty sure beforehand that private industry would respond to the offer of financial assistance for business extensions in these areas. It would be interesting to have the views of some of our readers on the question. We believe it is no exaggeration to say that, once the impetus of the building and rearmament programme has slowed down, the fate of the National Government may well depend on whether vigorous steps have been taken in time to deal with the special areas.

Garston's Loss—Swansea's Gain

ASSOCIATIONS extending over a period of seventy-one years are to be broken by the closing down of the Crown Copper Works of I.C.I. (Metals), Ltd., at Garston, consequent upon the transfer of activities to Swansea. A small beginning was made in 1865, when Mr. John Bibby, founder of the works, moved from Seacombe to Garston, taking with him a number of old workmen, four of whom remained to celebrate the jubilee of the establishment of the Garston works in 1915. Changes have been constant, as indeed they must be in the organisation and equipment of the works to meet the changing times and the progress in science and invention, and the copper works has thus been kept abreast of the times and industrial demands. But through all the changes one feature remained constant, and that was the happy relationships between the workers and the management, which up to a few years ago was personally directed by a succession of members of the Bibby family. Rationalisation affected the Crown Copper Works as it did most other industries, and the firm passed under the control, first of the Broughton Copper Co. and then of Imperial Chemical Industries. The closing down is an evidence of the progress which adds to the prosperity of one district and sometimes to the impoverishment of another. It is hoped at Garston, however, that some other industry will come in to take over the well-situated site and thus balance the employment facilities of the district.

Police Laboratories

CHEMICAL science is being applied to a constantly increasing field of operations, and its advantages in the sphere of crime investigation are now receiving the attention of the Home Office. Suitable sites for the establishment of a new police science laboratory at Birmingham, to serve the whole of the forces in the West Midlands, are being considered with the approval of the Home Office. The proposed building is intended to provide accommodation for pathological and chemical research, photographic and microscopic work and will be at the disposal of the police forces over a wide area. The scheme is the outcome of the decision of the Home Office to foster the provision of scientific laboratories in various parts of the country on similar lines to those at Hendon and Nottingham. The latter has been in full operation for some years and its work has resulted in the solution of many difficult problems which might otherwise have baffled the police. It is well known that the Home Office has for some time desired to place the scientific side of police work on a sound basis, and it is prepared to co-operate with local authorities and to give financial assistance to schemes which can be shown to be of practical utility to forces in the district where they are established. Thus the Hendon laboratory is available to police in London and the home counties; Nottingham may be used for scientific work by any of the forces in the East Midlands, and in certain cases further afield, and Birmingham is to be the centre for the West Midlands. Nevertheless, it has taken the Home Office very many years to realise the value of scientific methods in the detection of crime, for police laboratories were in action on the Continent long before 1914!

The British Association Meeting

Chemistry and the Community

FOLLOWING the Chemistry Section presidential address by Professor J. C. PHILIP, F.R.S., on "The Training of the Chemist for the Service of the Community," at the British Association meeting on Thursday, September 10, three general papers were read upon subjects coming under the heading of "Chemistry and the Community."

In his paper on "Industry and the Profession of Chemistry," Mr. M. P. APPLEBY said the chemist's industrial importance is more widely appreciated every year, but is yet not fully realised in some industries whose operations are largely chemical. The chemist may be of service in (a) analysis, (b) process control, (c) sales service, (d) research, (e) management. The use of fully trained chemists tends to efficiency, reduction of costs and profitable development. In regard to (e), a well-organised chemical education compares with other studies as a preparation for all the duties of management.

Industry and the Chemical Council

Industry depends on strong schools of chemistry, giving sound teaching of fundamentals and inspired by active research. Recruits for the chemical industry should have an honours degree and two or three years' research experience designed to give experimental training and to develop perseverance and resource. An industrial bias to the research undertaken in training is neither necessary nor desirable. Languages are almost indispensable, and men who have shared fully the general activities of their universities are most useful. The obligations of industry to the chemical schools are best discharged by the subsidising of research by research fellowships and by grants for special apparatus and chemicals. Industry should facilitate the active participation of its technical staff in the operations of the publishing societies, and should support the Chemical Council in improving publications, providing library facilities and generally promoting the consolidation of the chemical profession.

Gifts of Organic Chemistry

Mr. C. J. T. CRONSHAW dealt with "The Benign Gifts of Organic Chemistry." He pointed out that the science of chemistry has grown out of the earliest times, but that part which we call organic chemistry is relatively a modern development. The discovery of mauve by Perkin and his commercial exploitation of his invention showed to the world the possibilities of this branch of chemistry. Upon this discovery Germany gradually erected a great and progressive industry. The uses of colour in a modern civilised world are so varied that it is difficult for a person to-day to look back and realise the meagre uses of colour before 1870. The success of the dyestuffs industry showed in a very clear way the importance of organic chemistry as a tool in a modern world. The practice of medicine has been enriched by this same tool—the whole range of local anæsthetics, many of the sleep-inducing compounds, and the sole remedy for sleeping sickness, are the results of this molecular architecture. Modern photography, particularly in the developers and sensitisers, is the gift of this branch of chemistry. It has given the textile industry two new fibres. Recently in its work on detergents and vitamins it still carries the torch.

Biochemistry and Medicine

A paper by Sir HENRY DALE, F.R.S., concerned "The Training of Chemists for Work in the Fields of Biochemistry and Medicine." Even in the study of the complex phenomena of immunity, the results of recent years have shown a beginning of exact description in terms of organic and physical chemistry. Up till about 1920 only some four hormones were known as separable entities, and of these only two had been chemically defined. In the last few years a whole series has been chemically isolated, and several have been made artificially by synthesis. Of the vitamins, known a few years ago only by the effects of their absence, four or five have been chemically identified, and at least three have been artificially prepared. Sex hormones, one vitamin, carcinogenic substances, and heart tonics have all been chemically related to the typically inert sterols. New synthetic compounds of chemotherapeutic value give promise of control over some of the most deadly infections of man, especially in the tropics. The whole orientation of therapeutics is being shifted from the effects to the causes of disease. This new and increasing domination of biological and medical research, by chemical methods and ideas, represents the greatest of all the services of chemistry to the community. It calls for chemists of the highest ability, so trained that they can fully co-operate and share the planning of future progress with those primarily trained in biology and the medical sciences.

Discussion on Electrodeposition

FRIDAY, September 11, was devoted to a discussion on "Electroplating," the subject being introduced by Mr. D. J. MACNAUGHTAN, with contributions by Mr. A. W. HOTHERSALL ("Development of Control in Electrodeposition Processes"); Dr. S. WERNICK ("Electrodeposited Coatings as Corrosion Preventives"); Mr. E. A. OLLARD ("Non-tarnishable Finishes"); Mr. C. F. J. FRANCIS-CARTER ("Advances in Industrial Electroplating"); and Dr. H. J. T. ELLINGHAM ("The Future of Electrodeposition").

In the more restricted sense of the term, "electroplating" consists in the production of a thin coating of a metal over the surface of a metallic object by passing a direct electric current through a solution of a salt of the metal to be deposited, the article to be plated being immersed in the solution and forming the negative electrode or cathode. This type of process is very closely related, however, to a number of others involving the electrodeposition of metals—the production of relatively very thick, strongly adherent deposits for "building up" worn or undersized machine parts; the formation of an oxide coating on aluminium or its alloys by using the metal object as the positive eectrode or anode in a suitable solution; the production of non-adherent deposits which, on detachment from the surface on which they are formed, reproduce faithfully details of surface structure (electrotyping) or the complete shape of an object (electroforming)—and the term "electroplating" is sometimes used to include some or all of these cognate electrodeposition processes.

Although most of these various applications of electrodeposition were devised nearly a century ago, developments during the last twenty years have been so important that the scope and status of the industry have been completely changed. The range of metals electroplated has been extended by the important addition of chromium and recently of rhodium; "anodising" of aluminium and its alloys has been introduced; and progress has been made in the simultaneous deposition of two metals to give alloy coatings. The electrodeposition of the "base" metals, zinc and cadmium, essentially for the protection of iron and steel against corrosion, has become an important commercial process; and electrodeposited coatings of tin and, in special circumstances, of lead, have also been applied for this purpose. The scale

of nickel plating has been enormously expanded, partly on its own account but chiefly because of the importance of nickel as an "undercoat" for chromium; and the particular need for ensuring the deposition of firmly adherent, reguar, non-porous nickel coatings for this latter purpose has greatly stimulated investigation of the factors which determine these properties, and has led to outstanding improvement in the quality and reliability of nickel coatings. The non-tarnishable finish imparted by a thin "flash" of electrodeposited chromium to many classes of metal ware has received wide-spread application and has served to arouse a new interest on the part of manufacturers and members of the public in electroplating in general. The recent introduction of rhodium plating to furnish a non-tarnishable coating on silver ware bids fair to extend this interest. In the meantime, the old-established processes of plating cooper, silver and gold have maintained their positions in their respective fields.

In all these developments important parts have been played by the metallurgist, the physicist, and especially the chemist. The importance of close co-operation between the research laboratory and the plating shop became fully recognised during the war, and is now accepted as the necessary basis for progress.

More Exact Control

As a result of studies of the functions of various ingredients in plating baths, some simplification of the older "formulæ" has been effected, and it has become possible to exercise a much more exact control over conditions of operation, and hence over the character and properties of the deposit. A better understanding of the influence of effective acidity (pH value) on the conditions of deposition, especially of nickel, has been vital to securing sound deposits of adequate thickness under modern conditions of mass production. The study of the factors enabling the plating process to penetrate into recesses in the object to be coated, instead of occurring unduly preferentially on projecting regions nearest to the anode, has led to the production of solutions for which this "throwing power" is high enough to permit the deposition of a reasonably even coating on articles of complicated shape. Investigations on the effects of "addition agents" of various kinds—especially colloids and other sugstances of high molecular weight—have resulted in the production of smooth, coherent coatings from solutions which otherwise yield coarsly crystalline, irregular, or spongy deposits; and are now leading to the direct production of coatings so lustrous as to eliminate the need of polishing—a matter which may be of special importance when the size or shape of the article, or the properties of the deposit, render the polishing process difficult and costly.

Exact correlation of conditions of deposition with the character and properties of the deposit requires the provision of quantitative tests of properties of the coating such as hardness, porosity, internal stress and adhesion; the introduction of such tests has furnished important information which enables these properties to be accurately controlled in practice and has led to developments in the use of electrodeposition for special purposes such as the electroforming of sheet and tube, the building up of worn machine parts, and the provision of a hard facing on gauges, press tools, printing cylinders, etc.

A further stage consists in correlating these properties with the crystalline structure of the deposit. Microscopical examination of etched surfaces and sections has done much to indicate the size, shape and general arrangement of the crystallites of which the deposit is built up, and even to detect the presence of non-metallic matter—*e.g.*, oxides—which, entering the deposit in a colloidal state, may profoundly modify its crystalline character. Problems in this field, involving the actual nature of adhesion of electrodeposits, and the manner in which their structure is built up, are also being attacked by X-ray examination and more recently by electron diffraction methods.

Increased Reliability

The striking improvements which have been made—especially during the last ten to fifteen years—in the control of the whole plating process, including the very important preliminary cleaning operations required to free the surface of the basis metal from traces of grease or other impurities which would prevent perfect adhesion of the coating, have raised the general standard of quality and reliability of plating to a remarkable extent and given users a real confidence in its value for a wide range of new industrial purposes. The resulting increase of demand has stimulated the introduction of mass-production methods for plating articles in automatic plants; the articles to be plated are carried at a regular rate by conveyor chains through a succession of tanks and chambers in which the operations of cleaning, washing, plating, rinsing and drying are conducted in their proper sequence and each for its appropriate time; such plants have become a feature of modern electroplating industry. An automatic nickel-plating plant may carry 3,000-5,000 gal. (or even more) of solution and as much as 5 tons of nickel anodes. It is estimated that the total area covered by nickel plate alone amounts to 250 million sq. ft. per annum.

Progress along the lines indicated may be expected to continue in the future. Moreover, the practice of electroplating will no doubt be further modified and extended as a result of new advances in pure science, and the range of application of electrodeposited coatings widened by new developments in other industries.

In connection with this discussion electroplating exhibits, arranged by the Electrodepositors' Technical Society, were on view in the chemistry laboratory of the Grammar School, adjacent to Section B meeting room.

Papers on Photochemistry

A DISCUSSION on "Photochemistry" took place on Monday, September 14, the introduction being by Dr. R. G. W. NORRISH, F.R.S., and contributions by Mr. H. W. THOMPSON ("Molecular Spectra as a Guide to Photochemical Reaction"); Dr. T. G. PEARSON ("The Photochemical Generation of Free Radicals"); Dr. R. G. W. NORRISH, F.R.S. ("Photochemistry of Polyatomic Molecules"); and Dr. H. W. MELVILLE ("Photochemical Chain Reactions").

The earlier measurements on photochemical reactions were made largely to determine the quantum efficiencies of the reactions from the standpoint of the Einstein Law. The development of the theory of reaction chains from the study of the effect of inhibitors, the high values of the quantum yields, and other considerations, made it clear that there are two essential parts to a photochemical change: (1) the primary process; (2) secondary processes, which are quite independent of the primary one. It is with the so-called "primary processes" that spectroscopic considerations are mainly concerned, for it is clear that the nature of the absorption spectrum of the reacting substance must be a guide to the manner in which the light energy is absorbed. This correlation of absorption spectrum data with photochemical measurements has perhaps been the most significant advance in the subject in recent years.

Briefly, it can be said that the main problem is to decide whether the primary process involves mere excitation, or one-act dissociation. The spectral evidence often makes a decision between the two alternatives possible, although there is in some cases, especially with polyatomic molecules, some ambiguity. Spectral evidence also makes it frequently possible to determine the products of a primary one-act dissociation, but the limitations of this raises many crucial questions. In Mr. W. H. THOMPSON's paper the nature of the energy levels of a diatomic molecule and the theory of the

structure of an ideal absorption spectrum were outlined, and the significance of potential energy curves was discussed at some length.

Three types of absorption spectrum are found in practice: (a) those which are fine-structured or discrete throughout, (b) those which are entirely continuous, and (c) those which show either diffuseness throughout or have both discrete and diffuse regions.

During Monday afternoon, Dr. R. G. W. NORRISH, F.R.S., and Dr. H. W. MELVILLE gave an experimental demonstration illustrating the principles of photochemistry, in the lecture theatre of the Grammar school.

Chemistry and Food Science

PAPERS read on Tuesday, September 15, came under the eneral heading of "Chemistry and Food Science," the subject being introduced by Sir F. E. SMITH, F.R.S.

Dr. L. J. HARRIS, in a paper on "The Nutritional Aspect," said the final criterion by which the work of the food chemist must be judged is nutrition, i.e., does the food afford adequate nourishment? Chemical research has led to striking advances, such as are exemplified in the isolation, the determination of the structure of, and the artificial synthesis of vitamins. As a result the clinician can now prescribe an exact number of International Units of a synthetic vitamin; and nutrition is becoming an exact science instead of a matter of opinion. But the study of nutrition involves also the use of biological, and physical, and other methods, and this justifies and indeed necessitates the existence of a new scientific expert—the nutritionist. Nutrition in its applications is also bound up wth agriculture and economics. The nutritional condition of the people as a whole is better than it was, but there is ample room for further improvement.

Food Storage Science

A difficulty in assessing malnutrition in the past has been the lack of standards of reference, but newer chemical and clinical methods for determining partial deficiencies are now offering themselves. Evidence of malnutrition, presumptive or direct, is obtained along several different lines, *viz.*, (1) economic (*i.e.*, insufficiency of money spent on food), (2) dietetic (inadequacy of food eaten), (3) medical (existence of disorders of deficiency), (4) sociological (comparison of the health standards of poorly-fed and better-fed social groups), and (5) experimental (improvement in health observed in controlled tests when the inadequate food is suitably augmented).

A paper by Dr. L. H. LAMPITT dealt with "The Scientific Aspect of the Preparation of Food," and one by Dr. F. KIDD with "The Biology of Food Preservation." It was emphasised that food storage is the link between the farmer and consumer; it dates from earliest times, but modern civilisation, with industry and farming each concentrated and often separated by oceans, has greatly increased its importance.

Standards of Reference

The aim of food storage science is not simply to maintain the condition of the foodstuff as it exists on the farm, but instead to modify and control changes so as to yield, after a predetermined interval, pleasant and desirable foods. The demand for standard products which are also best suited for storage has exercised, and continues to exercise, a profound influence upon the theory and practice of farming which is, in fact, being industrialised. Foods consist of living materials, such as fruits, vegetables and cereals; and dead but still complex and organised structures such as meat and fish. The properties and behaviour of these foodstuffs during storage were discussed to illustrate, on the one hand, the breadth of the scientific background, and, on the other, types of practical applications which have emerged from the laboratory. Food science can be regarded as a distinct branch of teaching and research, coming between agriculture on the one hand and medicine on the other.

Mr. T. M. HERBERT (research manager, L.M.S. Railway), in a paper on "Transport of Food," gave a brief historical survey to show that whilst there have in past ages been examples of dependence on food imports, problems of food transport hardly achieved serious importance until the industrial era. Since this date, Great Britain has occupied a unique postion in the world trade in foodstuffs, and the magnitude of the problems involved in supplying her requirements was indicated statistically. The development of the world trade in wheat, and the much more difficult problem of ensuring this country's meat requirements between 1870 and 1900 was also outlined. The present-day problems relate mainly to the conveyance of perishable foods requiring controlled conditions of transport. Maintenance of suitably low temperatures, or provision of adequate ventilation, are the primary requirements that the chemical engineer has to solve, *i.e.*, refrigeration methods adopted on shipboard and on rail or road vehicles. The part that transport can play in ensuring an adequate diet is stressed as an example of co-operation between chemist, physicist and engineer in the service of the community.

Sir JOSIAH STAMP, Professor H. G. DENHAM, Dr. G. ROCHE LYNCH, Dr. A. J. SMITH and others entered into the discussion which followed.

Synthetic Dye Trade in Poland

Effect of Government Action

THE general situation of the Polish synthetic dye industry was decidedly unfavourable throughout 1935, largely from competition of small manufacturers who disorganised the market. Large manufacturers could not compete with the sacrifice quotations made by their competitors, chiefly in the field of dyes easily manufactured and requiring neither special equipment, extensive professional knowledge nor heavy investments. Since these attractive production items were practically forced away from large manufacturers, whose production volume was thus restricted to high-class dyes and intermediates having a comparatively limited volume, their earnings were less satisfactory. This situation created considerable dissatisfaction and culminated in a request to the Ministry of Industry and Commerce for the concessioning of the Polish dye industry.

Owing to the importance of this industry, both to the trade and national defence, the Polish Government granted this request on the basis of the prevailing industrial law of 1934 and effected the concessioning of the dye industry as at October 1, 1935. Immediately large manufacturers forced their competitors into liquidation chiefly for non-compliance with the provisions of the concession established for the dye industry. Out of some 36 dye manufacturers operating at the end of September, 1935, only four remained at the end of the year. Notwithstanding this reduction of operative units the 1935 production volume slightly exceeded that of the previous year with 1,858,000 kilos as compared with 1,800,000 kilos, an increase of 3 per cent.

The number of products manufactured was increased with the addition of anthraquinone, alpha-naphthol, beta-oxynaphthoic acid, paranitroaniline and various rubber vulcanisers and rubber dyes. This list will be even greater in 1936 owing to the consolidation of the industry and the Government's willingness to finance certain investments required for the manufacture of different intermediates.

SODIUM sulphate exports from Germany during the first four months of 1936 totalled 58,528 metric tons, as compared with 35,844 tons in the corresponding period of 1935. Shipments to the United States totalling 34,146 tons.

Common Impurities in Cement Users' Chemicals

By E. T. ELLIS

BUILDERS who make extensive use of chemicals as additions to cement should take care to obtain these in as high a state of purity as possible. It is not generally known that the ordinary commercial samples are in some cases teeming with impurities, but it is no exaggeration to say that the irregular effects of some of these chemical additions to cements are largely or wholly due to impurities in the added substances, and the fault lies, therefore, with the user of them, and not with the cement manufacturer.

Many of these impurities are easily recognised, and builders would do well to familiarise themselves with the common ones. As an aid in this direction the following few notes are written, and cover the commonest impurities so far as chemicals ordinarily used with English cements are concerned.

Calcium Chloride

Builders who use calcium chloride for the curing of concrete, or who employ this salt as an actual addition to Portland cement with a view to making the concrete self curing, should take extra precautions to obtain a first-rate consignment. The commonest impurity in commercial samples of calcium chloride is magnesium chloride. Calcium chloride, however, also contains other impurities arising out of the various processes of manufacturing it. Thus, if it is prepared as a by-product in the production of potassium chlorate, it may contain traces of potassium chlorate, and also some calcium chlorate, both of which are objectionable from the cement user's point of view. If, on the other hand, the calcium chloride is obtained as a by-product in one of the processes of manufacturing sodium bicarbonate, it may contain traces of sodium bicarbonate, although care is usually taken to remove these, while it may contain very considerable quantities of ammonium chloride (salammoniac), an easily sublimable salt, which gives ammoniacal vapours when a small sample of the suspected chloride is heated with quicklime.

A fair test for the purity of calcium chloride, which should always be applied before it is used extensively for concrete curing operations, is to put a handful of the flaked form into a large saucer, and stand it in the open air so that it is protected from actual rain, but so that moist air can get free access to it. It should dissolve in a very short time in moisture absorbed from the atmosphere, and except for a few specks of dust, the solution should be perfectly clear.

Calcium Sulphate

Builders who make use of calcium sulphate for the regulation of the set of the cements they use should also be particular to obtain this chemical as free as possible from impurities. Many of the commercial samples sold as "gypsum" contain numerous impurities, and a whole article might at some future date be devoted to these and their elimination. It will, however, be sufficient to point out that all calcium sulphate used for cement and concrete work should be free from sodium chloride, it should contain no sodium sulphate, and calcium carbonate should also be entirely absent.

The presence of salt and Glauber's salt, *i.e.*, the first two of my named impurities, can often be detected by an increased amount of solubility of the sample, pure calcium sulphate being very sparingly soluble in cold water under ordinary conditions. If sodium sulphate is present, the addition of calcium chloride to a weighed suspension of the finely divided calcium sulphate will increase the quantity of calcium sulphate, *i.e.*, more will be obtained after filtration and drying than was originally used. If calcium carbonate is present the small solubility will be decreased, and effervescence will take place on dilute sulphuric acid being added and stirred well in a suspension of the sulphate. If the acid is not used in excess, its employment is a very satisfactory way of rendering such impure gypsums fit to use.

Hydrochloric Acid

Builders who employ hydrochloric or the so-called "muriatic" acid for scrubbing the surfaces of concrete blocks, to remove cement mortar, and to bring the aggregate into view, should not use just the first acid which is offered, as this may not be pure enough for the purpose. It is really better to obtain laboratory acid, and dilute it with distilled water, rather than to rely on commercial acids.

Impurities which builders should specially watch for in average samples of hydrochloric acid should they be compelled to use them, *i.e.*, not be able to obtain the laboratory acid, comprise soluble chlorides, free chlorine gas, arsenic and iron in a free state, and in various states of combination, and non-chloride alkali salts. If a small quantity of the acid is gently boiled, hydrochloric acid goes off as a gas. The liquor can then be gently evaporated to dryness, and the solid residue examined by analytical methods so that the impurities can be recognised. Provided that nitric acid and chlorine are absent, builders will find it is often a sufficient way of purifying the acid to boil it, and collect the fumes in distilled water. This can be done easily with very inexpensive apparatus, and chemical textbooks should be consulted for details.

Sodium Carbonate

Builders who use sodium carbonate for scrubbing the surface of old aluminous concrete, prior to making additions of new concrete prepared with aluminous cements, should see that the carbonate employed is not a mere mixture of carbonate and other different sodium salts. Among the impurities which have been detected in commercial samples, special mention may be made of sodium sulphate (which is very common), common salt, and sodium sulphite (which is easily oxidised to sodium sulphate if the carbonate is exposed to the air, although it turns white and loses some of its combined water in the process).

Very strongly alkaline samples of sodium carbonate which builders may purchase unknowingly, often contain free sodium hydroxide, which exerts too corrosive an action on the aluminous concrete, while other samples which do not dissolve readily in water often contain free lime as quicklime, this, of course, being changed into slaked lime the moment water is added. Some few samples of sodium carbinate offered to builders for the scrubbing of aluminous concrete surfaces yield foul-smelling hydrogen sulphide gas when treated with dilute hydrochloric acid, while others effervesce with all dilute mineral acids more briskly than they should, and analysis shows that they contain sodium bicarbonate. Lastly, a few samples of sodium carbonate give coloured solutions on being dissolved in distilled water, and analytical examination of these frequently shows that they contain objectionable iron salts.

Sodium Chloride

Builders who use common salt (sodium chloride) as an addition to the water used for moistening concrete mixtures during frosty weather, and to enable concrete work to be carried out at such times without the material becoming frozen, should satisfy themselves that they are only using salt, and not a mixture of saline matter with other chemicals. Salt is cheap enough, but as a matter of fact it is difficult to obtain really pure samples at a suitable price.

Builders should specially examine all samples of sodium chloride for magnesium chloride, which renders them very hygroscopic, and is technically objectionable for many reasons. Sparingly soluble samples should be tested for

calcium sulphate, this being separable as a residue by treating the salt with distilled water. Hydrochloric acid is often present if the salt is prepared by precipitation processes, and in that case a small sample dissolved in distilled water will give an acid solution. Sodium carbonate and sodium hydroxide may be present in small quantities if the salt has been prepared by the action of hydrochloric acid on alkaline carbonate or alkali, while occasionally sodium bicarbonate is found to be present, this being due to the salt having been prepared by the action of hydrochloric acid on sodium bicarbonate instead of upon the normal carbonate or hydroxide.

Several of these impurities are very easy to eliminate. For instance calcium sulphate can be got rid of to a satisfactory extent, but not, of course, completely, by dissolving the whole consignment of salt in water and filtering the sparingly soluble residue away. Hydrochloric acid can be neutralised by adding minute quantities of sodium hydroxide solution and stirring well, while sodium carbonate, sodium hydroxide, and sodium bicarbonate can be removed by adding hydrochloric acid to a solution of the salt, until effervescence ceases in the case of the carbonate and bicarbonate, and until the solution is neutral in the case of the salt containing caustic soda.

The final group of impurities of cement users' chemicals are present in sodium silicate. Builders who use this reagent as a dipping liquor for concrete blocks made with the aid of Portland cements and those of the rapid-hardening varieties, should again take all reasonable precautions to use pure silicate, as traces of impurities are apt to be unusually injurious, especially if they are soluble in water.

Many samples of sodium silicate offered to builders for use with cement-stone and concrete building blocks contain sodium hydroxide, which is strongly alkaline and very objectionable. Some samples contain free silica, which on account of its insolubility is inert, but it should be got rid of by dissolving the silicate in water and filtration, as it is, of course, no use in the dipping liquor. Silicic acid is another objectionable impurity which sodium silicate sometimes contains, and is not easy to eliminate under builder's ordinary working conditions. Sodium carbonate is the last impurity which should be looked for, though it is less common than sodium hydroxide, and builders should note that if it is present in large quantities it can be detected, or its presence assumed by effervescence taking place when the sodium silicate is treated with dilute hydrochloric acid.

Chemistry from Many Aspects

The American Chemical Society's Meeting at Pittsburg

ACHIEVEMENT in eighteen major divisions of chemistry was reported at the 92nd meeting of the American Chemical Society at Pittsburg, September 7 11. More than 3,000 chemists and industrialists participated, and 700 investigators joined in presenting papers disclosing their findings in nearly 500 independent researches now in progress in the laboratories of industry, education, the Federal Government, hospitals, foundations, and state and city services. Scientists from Canada, England and the Continent of Europe were among the speakers. Friedrich Bergius, Nobel prize winner, discussed the development in Germany of synthetic substances which are supplementing the world's natural resources; Dr. E. F. Armstrong, president of the Association of British Chemical Manufacturers, outlined the international task of chemistry in solving the outstanding world problems of agriculture and food, power, transport and housing.

A Variety of Industrial Fields

Hydrogenation of coal, the nation's oil resources, the carbonisation and the constitution of coal, new metals and alloys, synthetic resins and plastics, chemistry in steel making, natural and synthetic rubber and microchemical analysis were among the industrial fields covered. Soil conservation, food processing and preservation, vitamins, technical developments in meat packing, and chemical problems in the dairy industry were considered in 43 papers devoted to agriculture and food; 26 papers dealt with fertilisers. Research in silicosis, air pollution, poison hazards in industry, and the poison properties of ozone were topics at other sessions. Changes in technical education to meet the needs of industry were suggested at a national conference of teachers and industrial executives.

The Division of Biological Chemistry, of which Dr. C. G. King, of the University of Pittsburgh, is chairman, met on the opening day, 41 papers having been scheduled for presentation before this Division at sessions continuing two days. Other groups meeting on the opening day and their chairmen included: Division of Cellulose Chemistry—Dr. G. J. Ritter, Forest Products Laboratory, Madison, Wis.; Division of Fertiliser Chemistry—Dr. E. W. Magruder, Norfolk, Va.; Division of Gas and Fuel Chemistry—Dr. O. O. Malleis, Cincinnati; Division of the History of Chemistry—Dr. Tenney L. Davis, Massachusetts Institute of Technology; Division of Organic Chemistry—Dr. Henry Gilman, Iowa State College; Division of Petroleum Chemistry—Dr. F. W. Hall, New York City; Division of Physical and Inorganic Chemistry—Dr. J. W. Williams, University of Wisconsin.

Ninety-nine papers were listed for presentation before the Division of Physical and Inorganic Chemistry at sessions continuing four days. Professor N. H. Furman, of Princeton University, presided at a session on analytical chemistry, and Professor Henry Eyring, of Princeton, at a symposium on "Quantum Mechanics and Reaction Kinetics." Dr. Williams was chairman of a session on physical chemistry. Dr. G. F. Huttig, of the University of Prague, read a paper on "The Active Intermediates which are Formed During the Reactions Between Solids"; Dr. Andr. Voet, of the University of Amsterdam, explained "The Electrostatic Conception of Hydration and Solvation." A symposium on "Colorimetry," with Professor John H. Yoe, of the University of Virginia, as chairman, was also held.

At an all-day symposium on "Dielectric Properties of Matter," Professor Peter Debye, of the University of Berlin, a leading authority in the field of polar molecules, presented a paper on "Dielectric Properties of Pure Liquids," and Professor Nevil V. Sidgwick, of the University of Oxford, spoke on "Dipole Moment and Molecular Structure."

Physical Chemistry

Dr. Oldrich Tomicek and Dr. F. Poupe, of Charles University, Czechoslovakia, opened a physical chemistry section with a paper on "The Use of the Tellurium Electrode as Hydrogen Electrode," Dr. H. L. Johnston, of Ohio State University, presiding. "An Improved Film Balance of High Precision" was the topic of a paper by Professor William D. Harkins and Professor Robert J. Myers, of the University of Chicago. "Spectroscopic Methods of Analysis" were the theme of a symposium at which Dr. W. C. Pierce, of the University of Chicago, presided. There was also a symposium on "Thermal Chemistry and Bond Energy," with Dr. Frederick D. Rossini; of the National Bureau of Standards, as chairman.

World fuel experts addressed a symposium on the "Hydrogenation of Coal," Dr. M. Pier, research director of the I. G. Farbenindustrie, reading a paper on "Coal and Oil,"

in which he compared some of their hydrogenation products. Dr. F. S. Sinnatt, director of fuel research for the Department of Scientific and Industrial Research, Great Britain, Dr. J. G. King and Angus MacFarlane were the joint authors of a paper on hydrogenation. Research reports from Pennsylvania State College, the Coal Research Laboratory of Carnegie Institute of Technology, and the United States Bureau of Mines were also read. Another feature of the meeting was a symposium on vitamins sponsored by the Division of Agricultural and Food Chemistry, headed by Dr. J. H. Nair, of Syracuse, N.Y.

At the so-called "Central Day" of the meeting Dr. Bergius delivered an address on "Problems of Industrial Pioneer Work," and Dr. E. F. Armstrong inquired into the future of international chemistry, his paper being entitled "Whither?" Dr. John Johnston, director of research of the United States Steel Corporation, also presented a paper on "Some Aspects of the Chemistry of Steel." The ceremony opening the "Central Day" programme was notable for the presentation to Andrew W. Mellon of the Pittsburgh Award for outstanding service to chemistry. His brother, the late Richard B. Mellon, shared posthumously in this award, which has been made by the American Chemical Society's Pittsburgh Section in recognition of the work of the Mellons in the development of the Mellon Institute of Industrial Research. Chester G. Fisher, chairman of the Pittsburgh Section, made the presentation.

At a banquet in the evening the American Chemical Society Award in Pure Chemistry ($1,000) was presented to Professor John Gamble Kirkwood, of Cornell University. This award was endowed by A. C. Langmuir, of Hastings-on-Hudson, N.Y., and his brother, Dr. Irving Langmuir, of the General Electric Co., Nobel prize winner in chemistry, "to encourage creative work by chemists under thirty years of age." Professor Kirkwood, who is 29, has outdone the world's best minds in solving certain long-standing problems of molecular chemistry, according to the jury of ward heated by Dr. E. R. Weidlein, director of the Mellon Institute and president-elect of the Society. Following this award to Dr. Kirkwood, Professor Edward Bartow, of the University of Iowa, president of the American Chemical Society, delivered the Society's presidential address, his subject being "Progress in Sanitation."

New Metals and Alloys

A symposium on new metals and alloys applicable to the chemical industry met under the auspices of the Division of Industrial and Engineering Chemistry, of which Dr. W. G. Whitman, of the Massachusetts Institute of Technology, is chairman. Uses of steel, chromium, nickel, aluminium, lead and silver were discussed. A civilisation with metallurgy as its foundation is being built by science, according to the announcement made by B. D. Saklatwalla, president of the U.S. Rustless Steel and Iron Corporation, who spoke on "Fundamentals Governing the Practical Evolution of New Metals."

Public health problems were the general topic of a symposium of the Division of Medicinal Chemistry. Speakers and their topics included Dr. H. B. McDonnell, University of Maryland, "The Poisonous Properties of Ozone"; Dr. H. H. Schrenk and Dr. W. P. Yant, U.S. Bureau of Mines, "Studies of the Response of the Organism to Methanol"; Dr. R. R. Sayers, U.S. Public Health Service, "Silicosis"; Dr. H. B. Meller, Air Hygiene Foundation of America, "The Social Significance of Air Pollution"; and Dr. Wm. J. McConnell, Metropolitan Life Insurance Company, "Poison Hazards in Industry."

The Division of Colloid Chemistry, of which Dr. S. S. Kistler, of Worcester, Mass., is chairman, conducted a symposium on "Synthetic Resins and Plastics." The Divisions of Agricultural and Food Chemistry and Biological Chemistry held a symposium on "Food Processing and Preservation." "What Industry Wants of Its Chemists" was the theme of another symposium by the Division of Chemical Education.

Instrument Craftsmanship and Draughtsmanship

Physical Society's Annual Competition

THE Physical Society announces that the eighth annual craftsmanship and draughtsmanship competition will be held as usual in conjunction with its annual exhibition of scientific instruments and apparatus in January next. Competitors must be in the regular employ of a firm or institution which will be exhibiting or has exhibited at least once during the previous three years, and which has been invited by the organising committee to enter its employees for the competition.

Commenting upon the last competition in the "Journal of Scientific Instruments," Dr. R. S. Clay wrote: "The steady rise in standard of the work submitted is evidence that these competitions are helping to maintain the old standard of craftsmanship which there is ground for believing was deteriorating. It may be that mechanics and precision lathes can obtain an accuracy which is actually greater than that attained by the older mechanics by sheer skill;; but on the other hand, they should possess a wider knowledge than was previously necessary if they are to use these machines to the greatest advantage, and if they are intelligently to be able to make the great variety of instruments demanded by modern physicists. Even so, they will waste much time if they lack the skill to enable them to do good handwork—if, for example, they cannot chase a thread by hand and have to set up a screw-cutting lathe instead. Ability to read and also to make working drawings is obviously necessary, hence the competition emphasises this by the offer of prizes both for combined work and drawings as well as for drawings alone."

We commend the competition to those firms who have apprentices or learners eligible to take part.

United States Safety Congress

Chemical Section Programme

AN interesting programme has been arranged for the chemical section of the 25th United States National Safety Congress and Exposition, to be held at Atlantic City from October 5 to 9. The sectional officers will be: General chairman—Mr. A. L. Armstrong, Eastman Kodak Co., Rochester; vice-chairman in charge of programme—Mr. H. L. Miner, E. I. du Pont de Nemours and Co., Wilmington; vice-chairman in charge of engineering—Mr. Ralph L. Rogers, Jr., Tennessee Eastman Corp., Kingsport; secretary—Mr. Ralph O. Keefer, Aluminium Company of America, Pittsburgh.

The following papers will be presented and discussed: "Instructional Training or Fundamentals of Safety that Every Chemical Worker Should Know," by Mr. John S. Shaw, manager, safety and service department, Hercules Powder Co., Wilmington; "Safety Educational Methods"—a round table discussion led by Mr. John Roach, Deputy Commissioner of Labour, State of New Jersey, Trenton; "New Legal Aspects of Chemical Industry Hazards," by Mr. J. W. Newton, compensation and claims departments, Eastman Kodak Co., Rochester.

In the course of the congress nearly 400 speakers will emphasise accident prevention in industrial plants, on the street, in the home, in schools, in the air and at sea. The 150 different sessions will be held in the headquarters hotels and the Atlantic City Auditorium, the largest building of its kind in the world. The exposition—a huge display of equipment for safeguarding dangerous operations of all kinds—will be held in the grand ballroom of the Auditorium. Separate programmes have been arranged for industries in more than 30 sections, such as cement, chemical, construction, mining, marine, petroleum, public utilities, and others. There will be general sessions on industrial health, industrial nursing, occupational diseases and safety equipment.

Letters to the Editor

The Institute of Export

SIR,—Membership of the Institute of Export, inaugurated only eight months ago, stands at 350. This probably compares more than favourably with the achievements of other professional organisations relying upon the support and subscriptions of individuals. It demonstrates that its aims and objects are endorsed by those in the best position to judge, and provides confirmation of the belief in the need for an organisation devoted solely to the interests of export trade and those engaged therein.

Perhaps the most vivid impression so far derived from its brief existence is that there is throughout the country an appalling ignorance of the importance of export trade. There is an urgent need, which the Institute is endeavouring to meet, to educate the nation on one of its greatest duties to itself. For those engaged in export we have endeavoured to provide something of practical value in the daily conduct of affairs. Experts have given addresses on the law of C.I.F. contracts, the British Colonial market, the international telephone and its service to exporters, banking in relation to export, and packaging for export; and the immediate programme comprises addresses on insurance for export, international cartels and film publicity as an aid to export.

The many problems which confront exporters in their day-to-day business, investigation of which would prove to the common good, have been entrusted to a research committee. At present this committee is engaged in deciding the most efficient means of obtaining information upon the potential values of overseas markets, how market research can best be conducted, and the best means of meeting the competition of newly-established industries abroad.

The education committee, in collaboration with leading educationists, has drawn up special courses of instruction in export subjects whereby recruits to the export trade can for the first time enter it with recognised qualifications. In fact, through those courses of instruction the first attempt will be made to give comprehensive training in the conduct of the country's most vital industry.

From time to time the Institute has directed public attention to the paramount importance of export trade—not only as a means of livelihood in times of peace, but also because of the contribution it makes, by the maintenance of a strong mercantile navy, to national safety in times of war. I appeal to all interested in export trade to give us the support we must have if we are to get on with our job expeditiously and successfully.—Yours faithfully,

R. J. TURNER,
Chairman.

Institute of Export,
21 Tothill Street, S.W.1.

Science and Academistry

SIR,—Some years ago I carried on in your columns a discussion on professionalism with Sir Onslow Forster, in which I claimed that this might be an enemy to progress in many directions. I did not reply to my friend's query, What is Professionalism? Emerson refused to define beauty, remarking that everyone knew what it meant when they saw it.

Recently Sir Josiah Stamp has discussed the position of science in the modern world. Had he recognised the more recent science of academistry, which is parasitic to science, he might have presented a clearer account of the present position. Dealing with another position elsewhere, Dean Inge recently defined oratory as the art of never saying in one word what could be said in five, and undoubtedly there is too much of this kind of thing in science also.

Some four or five years ago academistry and its followers laid economics in the dust for decades, and it was necessary to point out the essential conditions to its re-birth, these being based upon the definition of Kelvin as to what could be regarded as science and what could not. In a subsequent address Sir Josiah Stamp agreed that Kelvin's words should not be forgotten. The fact that the Press has so universally welcomed the excursions to the "fun fair" at Blackpool by those who were in such learned discussion in that town indicates a general relief when our academics really turn to play and ordinary life.

The future success of civilisation will depend upon experimental science and social science running in double harness, and the general acceptance of a common policy such as was laid down fifty years ago in an important work named "Scientific Meliorism" (Jane Hume Clapperton). It would be a waste of time to start *de novo* and assume that nothing of the past is of any value; or to overlook the general uncertainty due to the want of a general recognition of what is required.

That so distinguished a worker as Charles Darwin was willing to wish this work God-speed, and that recently Mr. Ramsay MacDonald has spoken so highly of its qualifications, referring to it as his "intellectual anchorage," indicates that its views and generalisations may secure a very general acceptance in time. A scheme of philosophy which falls in generally with the requirements of practical science and also receives general consent should not be overlooked at the present uncertain period in the advance of western civilisation.

The League of Science has endeavoured to bring greater recognition to Scientific Meliorism by issuing a series of leaflets dealing with its possible influence on modern day conditions, and those interested may secure copies of these on demand.—Yours faithfully,

W. P. DREAPER,
Hon. Secretary, League of Science.

27 Willow Road, London, N.W.3.

Anti-Gas Training

SIR,—It was with great interest that I noted your editorial reference to anti-gas training, in THE CHEMICAL AGE of September 5, and have awaited possible further reference to this matter or some further communication from interested readers. I hope that you will not allow this matter to pass by, as the question you have raised is of great importance, especially in industrial areas open to air-raid attack, and local authorities at present are tackling this problem without having the necessary knowledge wherewith to devise practical schemes under the guidance of men experienced in gas warfare.

One is therefore compelled to raise the question as to whether the Air Raid Precautions Department is taking steps to avail itself of the large number of men who, during the period of 1914-18, obtained valuable experience in connection with gas warfare and all its aspects. Apparently, the Air Raid Precautions Department is trying to draw a veil of mystery over the development of gas warfare, and your comments were obviously justified.

Quite recently I came in touch with an ex-member of the Special Brigade who, after having been abroad for some time, was compelled to return home and seek a new job, and I approached the Air Raid Precautions Department with a view to his employment in this connection. Its observations were that: "The instructors in our anti-gas schools require a degree of experience both in instruction and in research which is rarely found, and we have not, therefore, much hope of the man to whom you refer being suitable for such an appointment."

Surely one may ask, in view of this, what is the degree of experience in instruction and research that it can be so rarely found, and what use is to be made of it when found? How many of the staff of the department have actual experience of gas warfare?—Yours faithfully,

A. V. HUSSAY.

Mardale, Watts Wood,
Purfleet, Essex.

The Manufacture of Synthetic Acetic Acid*

By Dr. O. Zahn

ACETIC acid was formerly obtained exclusively by the distillation of wood *via* calcium acetate, but that process is not much used nowadays because it has proved to be more economic to manufacture it synthetically from calcium carbine. After the war the demand for actetic acid increased owing to the introduction of acetate rayon and other materials produced from acetyl cellulose, and consequently large-scale plants for the manufacture of synthetic acetic acid are to-day in operation in all industrial countries.

In all these plants, acetic acid is produced from acetylene in two distinct operations; firstly, the hydration of acetylene to acetaldehyde

$$C_2H_2+H_2O=C_2H_4O,$$

and secondly, the oxidation of the acetaldehyde to acetic acid

$$C_2H_4O+O=C_2H_4O_2.$$

The formation of acetaldehyde by the addition of water to the acetylene molecule was first published by Kutscheroff in 1881[1] and was confirmed in 1898 by Erdmann and Köthner, who recognised that it is a catalytic reaction which proceeds in the presence of mercury salts[2]. K. A. Hofmann at the same time carried out investigations with a view to clearing up the reaction[3].

Carrying Out the Reaction

An excess of acetylene is added to dilute (10 to 40 per cent.) suphuric acid at from 40 to 80° C. The reaction may be carried out in a vessel fitted with a stirrer, or in a tower of acid-resistant metal, stoneware, or iron lined with an acid-proof coating. The catalyst is always mercury, either as metal or in the form of oxide, in the presence of an oxidant. The mercury oxide dissolves in the liquid to form sulphate, which in turn reacts with acetylene to form a white precipitate of trimercuric aldehyde, which is reconverted by more strongly concentrated acid and heat into mercury salt and acetaldehyde. The mercury salt is simultaneously reduced, so that a sludge of metallic mercury is deposited which must be re-oxidised to mercury oxide, either electrolytically or by means of nitric acid.

The excess acetylene leaves the reaction vessel charged with vapours of acetaldehyde, which boils at 20.8° C. It is then cooled, freed from the acetaldehyde, which readily dissolves in water, by washing it in a scrubbing tower or otherwise, and is finally returned to the reaction apparatus with the addition of fresh gas.

The acetaldehyde solution contains from 12 to 25 per cent. of acetaldehyde, depending upon the extent to which the reaction is carried out and the temperature of the washing water. Technically pure acetaldehyde, containing traces of water, croton aldehyde, and acetic acid, is obtained from the solution by rectification, and is then oxidised to acetic acid. Traces of mercury compounds are entrained by the aldehyde during this operation and must be removed from the acetic acid by means of an oxidant, such as permanganate, when the acid is intended for human consumption.

Conversion of Acetaldehyde

The conversion of acetaldehyde to acetic acid is very much simpler than the hydration of acetylene. Acetaldehyde and oxygen combine directly and approximately quantitatively in the presence of a manganese catalyst to form acetic acid of about 97 per cent. strength. The reaction is carried out in a vessel made of some acid-proof alloy, or stoneware, and with a reflux condenser which condenses the acetic acid escaping with the waste gas. The quantity of the waste gas depends on the purity of the oxygen used. The recovery of acetic acid from the waste gas is more difficult when air is used instead of oxygen, because higher pressure is then required for the oxidisation; when oxygen is used, little more than atmospheric pressure will suffice to convey the acetaldehyde and oxygen to the reaction vessel.

Although the oxidation of acetaldehyde to acetic acid may appear to be quite a simple process, especially when oxygen is being used, the operation nevertheless calls for certain precautionary measures and a great deal of experience. Peracetic acid, which is explosive, is first formed by the oxidation:—

(1) $CH_3COH+O_2=CH_3CO_3H$
acetaldehyde peracetic acid

(2) $2CH_3CO_3H$ heating $=2CH_3COOH+O_2$
peracetic acid acetic acid

(3) $2CH_3COH+O_2$ (set free from 2) $=2CH_3COOH$
acetaldehyde acetic acid

Risk of Explosion

In order to eliminate the risk of explosion as far as possible, the oxidation must always be carried out within a temperature range of from 20 to 80° C. The reaction vessel must be capable of being cooled, as well as heated. Oxidation is best kept under control by diluting the acetaldehyde, for which purpose the most suitable diluent is the concentrated acetic acid that is formed. Oxidation can be carried out either continuously or at intervals; a small quantity of the reaction mixture dissolved in the acetic acid will always be left behind in the reaction vessel.

Methyl acetate, water, and formic acid are formed as by-products. When 99.5 per cent. oxygen is used, the composition of the reaction product is approximately:—

Acetic acid	97—98 per cent.
Methyl acetate	1—2 ,, ,,
Water	1—2 ,, ,,
Formic acid	0.2—0.5 ,, ,,
Acetaldehyde	traces

The yield is about 95 per cent. both in the hydration process as well as in the oxidation process.

The production of acetaldehyde and acetic acid is attended with danger. The tendency of acetylene to explode is well known; acetaldehyde is very inflammable. In the presence of small quantities of acids or bases, acetaldehyde tends to polymerize with a considerable evolution of heat. Mercury can only be handled with suitable precautions from a hygienic point of view. The decomposition of any large quantity of peracetic acid takes place explosively.

Thoroughly Experienced Operatives

These dangers have been successfully eliminated by careful design of the equipment based on many years' experience, and by very accurate chemical control of all stages of the process. The operatives must be thoroughly experienced, because a series of separate processes has to be carried out which are then combined to produce a single effect. The manufacture of synthetic acetic acid embraces the following steps:—(1) The production of acetylene from calcium carbide; (2) the conversion of acetylene into acetaldehyde; (3) the production of oxygen by the liquefaction of air; (4) the conversion of acetaldehyde into acetic acid; (5) the refining of crude acetic acid for the production of glacial acetic acid, various grades of dilute acetic acid for use in the arts, and table vinegar; and (6) the recovery of mercury oxide.

A number of plants for the manfacture of synthetic acetic acid from calcium carbide have recently been erected by Zahn and Co. G.m.b.H., of Berlin.

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* Reprinted from "Engineering Progress," Berlin, August, 1936.
[1] *Berichte*, 1881, **14**, 1540; 1884, **17**, 13.
[2] *Zeitschrift fur anorgamische Chemie*, 1898, **18**, 54.
[3] *Berichte*, 1898, **31**, 2212 *and* 2783; **32**, 874.

British Overseas Chemical Trade in August

According to the Board of Trade returns for the month ended August 31, 1936, exports of chemicals, drugs, dyes and colours were valued at £1,539,070, as compared with £1,566,449 for the corresponding month of 1935, a decrease of £27,379. Imports were valued at £1,006,078, as compared with £975,408, an increase of £30,670. Re-exports were valued at £30,984.

Imports

	Quantities. August 31, 1935.	Quantities. August 31, 1936.	Value. August 31, 1935.	Value. August 31, 1936.
Acids—				
Acetic .. .. cwt.	11,751	14,965	17,507	17,008
Boric (boracic) ,,	2,820	2,620	2,839	2,751
Citric .. .. ,,	1,165	1,385	4,620	5,517
Tartaric .. ,,	2,886	1,668	12,208	6,899
All other sorts value	—	—	9,235	10,724
Borax .. .. cwt.	18,601	15,060	9,053	7,865
Calcium carbide .. ,,	120,757	84,835	60,895	43,001
Fertilisers, manufactured—				
Superphosphate of lime ton	—	100	—	198
All other descriptions ton	2,901	1,620	10,211	8,074
Phosphorus .. cwt.	1,975	—	6,381	—
Potassium compounds—				
Caustic and lyes ,,	11,110	8,183	13,040	9,870
Chloride (muriate) ,,	138,020	242,426	45,188	83,519
Kainite and other mineral fertiliser salts ,,	63,480	97,635	12,653	18,688
Nitrate (saltpetre) ,,	5,262	26,678	4,105	10,622
Sulphate .. ,,	63,062	125,118	24,691	54,101
All other compounds ,,	7,968	8,075	13,786	11,096
Sodium compounds—				
Carbonate, including crystals, ash and bicarbonate .. cwt.	3,451	452	1,386	234
Chromate and bichromate .. .. cwt.	2,291	4,483	3,328	5,368
Cyanide .. ,,	1,502	1,984	3,477	4,740
Nitrate .. .. ,,	60,317	90,040	11,978	18,951
All other compounds ,,	22,669	23,248	18,137	14,729
Other chemical manufactures .. .. value	—	—	275,589	235,767
Drugs, medicines, etc—				
Quinine and quinine salts .. .. oz.	79,199	96,625	5,851	6,764
Medicinal oils .. cwt.	2,913	1,343	19,258	6,967
Proprietary medicines value	—	—	39,013	42,490
All other sorts .. ,,	—	—	43,492	56,522
Dyes and dye-stuffs and extracts for tanning—				
Finished dye-stuffs (coal tar) .. .. cwt.	3,668	2,925	100,190	83,596
Extracts for dyeing ,,	5,210	5,750	11,133	13,371
Extracts for tanning (solid or liquid)—				
Chestnut .. cwt.	20,204	24,428	13,483	17,727
Quebracho .. ,,	25,722	59,568	17,359	51,390
All other sorts ,,	26,756	30,395	18,797	21,743
All other dyes and dye-stuffs .. .. cwt.	848	1,196	16,932	14,483
Painters' colours and materials—				
White lead (basic carbonate) .. cwt.	7,512	6,143	8,982	8,204
Lithopone .. ,,	20,018	22,582	13,346	14,227
Ochres and earth colours cwt.	28,426	26,102	10,486	9,854
Bronze powders ,,	1,724	1,513	11,650	10,639
Carbon blacks .. ,,	35,582	31,115	51,748	46,408
Other pigments and extenders .. cwt.	25,141	31,205	8,172	7,334
All other descriptions ,,	12,240	12,547	25,209	24,637
Total .. .. value	—	—	975,408	1,006,078

Exports

Acids—				
Citric .. .. cwt.	3,355	1,982	14,018	8,943
All other sorts .. value	—	—	19,773	19,169
Aluminium compounds ton	2,565	3,435	22,249	36,468
Ammonium compounds—				
Sulphate .. ton	22,381	14,256	129,722	84,793
All other sorts .. ,,	1,045	1,493	13,448	17,664
Bleaching powder (chloride of lime) .. .. cwt.	59,686	31,587	15,866	8,402
Coal tar products—				
Cresylic acid .. gal.	131,400	191,610	11,689	22,727
Tar oil, creosote oil, anthracene oil, etc. ,,	1,100,635	2,089,912	32,440	44,022
All other sorts .. value	—	—	15,220	17,140
Copper, sulphate of ton	799	573	11,053	8,445
Disinfectants, insecticides, weed killers .. cwt.	27,875	24,501	57,648	46,921
Fertilisers, manufactured ton	10,970	22,157	40,772	71,157
Glycerine .. .. cwt.	13,813	7,388	32,174	18,530
Lead compounds .. ,,	13,776	13,678	16,258	18,655
Magnesium compounds ,,	330	459	8,433	11,094
Potassium compounds cwt.	7,371	3,655	11,185	10,651
Salt (sodium chloride) ton	27,231	29,204	65,589	71,799
Sodium compounds—				..
Carbonate, including crystals, ash and bicarbonate .. cwt.	306,286	269,431	73,182	64,440
Caustic .. .. ,,	163,450	111,202	85,434	58,525
Nitrate .. .. ,,	11,022	10,529	3,700	3,477
Sulphate, including saltcake .. cwt.	100,026	133,564	7,795	12,893
All other sorts .. ,,	68,600	71,741	82,887	85,480
Zinc oxide .. .. ton	974	1,061	17,267	19,140
All other descriptions value	—	—	186,978	188,390
Drugs, medicines, etc.—				
Quinine and quinine salts .. oz.	136,103	167,411	15,216	18,172
Proprietary medicines value	—	—	80,787	80,759
All other descriptions ,,	—	—	131,832	128,950
Dyes and dye-stuffs and extracts for tanning—				
Finished dye-stuffs (coal tar)—				
Alizarine, Alizarine red and indigo (synthetic) .. cwt.	1,863	1,132	9,637	7,583
Other sorts .. ,,	5,213	5,609	71,880	78,274
All other descriptions ,,	15,797	17,247	21,208	19,858
Painters' colours and materials—				
Pigments and extenders, dry—				
Ochres and earth colours cwt.	14,787	17,097	14,915	15,329
Other descriptions ,,	29,331	17,822	28,515	26,556
White lead .. ,,	4,830	4,616	9,183	9,401
Paints and painters' enamels, prepared cwt.	38,853	35,823	97,361	95,438
Varnish and lacquer (clear .. gal.	68,266	60,454	25,938	23,500
Printers' ink .. cwt.	3,691	3,932	21,057	21,109
All other descriptions ,,	33,566	34,201	66,140	65,216
Total .. .. value	—	—	1,566,449	1,539,070

Re-Exports

Chemical manufactures and products .. value	—	—	17,190	17,557
Drugs, medicines and medicinal preparations value	—	—	10,191	11,962
Dyes and dye-stuffs and extracts for tanning cwt.	404	459	2,901	519
Painters' colours and materials .. .. cwt.	805	340	2,318	946
Total .. .. value	—	—	32,600	30,984

The Chemical Age Lawn Tennis Tournament

Singles Cup Goes to Port Sunlight: Doubles Match Drawn

REMARKABLY good play was witnessed at the finals of the sixth annual CHEMICAL AGE Lawn Tennis Tournament at the East Ham sports ground of the Gas Light and Coke Company on Saturday. Heavy rain, however, spoilt what would otherwise have been the best series of matches in the history of the tournament, the doubles match having to be abandoned after reaching a score of 6—4, 8—7 owing to rain and failing light. A large number of guests attended, some having travelled overnight from the provinces, including many players who had participated in the earlier rounds of the tournament, and they were warmly welcomed by Mr. Potter, on behalf of Sir David Milne-Watson, governor of the company.

THE CHEMICAL AGE silver challenge cup for the singles went to the provinces for the first time, Mr. C. C. Gough, of Lever Brothers, Ltd. (Port Sunlight), beating Mr. A. Baxter, of the United Yeast Co., Ltd. (London), by 6—1, 3—6, 12—14, 6—1, 6—1, a total of sixty-one games. The opening match was delayed for twenty minutes owing to rain, and although there were several long intervals of sunshine play had to be suspended for a time owing to a heavy downpour during the second set. The first set was comparatively short, Gough taking the first three games with only one point against him in each game. Baxter took the fourth game, conceding two points, and Gough the remaining three, only the last reaching deuce (twice). Baxter opened well in the second set, winning the first three games. Gough won the fourth after reaching deuce, and Baxter went on to lead 5—1. Gough then brought the score to 5—3, Baxter winning the set with a deuce game.

THE RESULTS

SINGLES:

C. C. GOUGH (Lever Brothers, Ltd., Port Sunlight)
beat
A. BAXTER (United Yeast Co., Ltd., London)
6—1, 3—6, 12—14, 6—2, 6—2

DOUBLES:

C. C. GOUGH and T. P. WILLIAMS
(Lever Brothers, Ltd., Port Sunlight)
drew with
A. E. C. WILLSHERE and L. F. GRAPE
(Borax Consolidated, Ltd., London)
6—4, 8—7 (match abandoned owing to rain).

The third set produced the extraordinary total of twenty-six games, Baxter winning by 14—12. No fewer than nine games were carried to deuce, one seven times, two three times, two twice and four once. Altogether there were 182 points in the set (93 to Baxter and 89 to Gough), despite the fact that there were five love games (three to Gough and two to Baxter).

The following table shows how the set progressed:

Game	1	2	3	4	5	6	7	8	9	10	11	12	13
Games score	G1	G2	B1	G3	G4	G5	B2	B3	B4	B5	G6	B6	G7
Loser's points	A 0	0	*1	15	30	30	30	30	*7	0	0	*2	

Game	14	15	16	17	18	19	20	21	22	23	24	25	26
Games score	B7	G8	B8	B9	G9	B10	G10	G11	B11	G12	B12	B13	B14
Loser's points	15	15	*2	15	*1	*1	15	*1	30	15	*3	0	*3

*Number of deuce points in game.

The fourth and fifth sets were uneventful in comparison with the third, though it should be mentioned that the run of the play was not so decisively in Gough's favour as the results implied, for Baxter took 25 points to Gough's 35 in the fourth set and 24 to 31 in the fifth.

In the doubles match, C. C. Gough and T. P. Williams, of Lever Brothers, Ltd. (Port Sunlight), won the first set at 6—4 and were leading 8—7 in the second when play had to be abandoned. The match was declared a draw, and THE CHEMICAL AGE silver challenge cup was awarded to be held by each pair for six months, the Port Sunlight pair, having the moral advantage, taking it for the first period. Owing to the unexpected length of the singles match a late start was made. The Borax pair won the opening game without giving a point, no doubt to the satisfaction of Mr. J. Gerstley who was one of the keenest spectators. Port Sunlight went ahead to 4—2 and Borax then drew level. The last two games both went to deuce, Port Sunlight winning on each occasion. In the second set Port Sunlight were at one time leading 5—1 and a decisive result was expected as it had been arranged to reduce the match to the best of three sets, but Borax won the next four games, conceded a game to Port Sunlight and carried the score to 7—6. Then Port Sunlight took the 14th and 15th games, playing until they were drenched.

The complete records of the finalists in the 1936 tournament are as follows:

Mr. C. C. GOUGH.—1st round, bye; 2nd round, beat Mr. C. T. Woodcock (British Tar Products, Ltd.), 6—4, 6—2; 3rd round, beat Mr. E. Pavitt (Co-operative Wholesale Society), 11—9, 3—6, 6—2; 4th round, walk-over; semi-final, beat Mr. A. W. A. Goudie (Tar Residuals, Ltd.), 6—2, 6—4; final, beat Mr. A. Baxter (United Yeast Co., Ltd.), 6—1, 3—6, 12—14, 6—2, 6—2.

Mr. A. BAXTER.—1st round, walk over; 2nd round, beat Mr. J. Hudson (Bakelite, Ltd.), 6—3, 6—1; 3rd round, beat Mr. V. D. Thompson (Stafford Allen and Sons, Ltd.), 6—3, 6—3; 4th round, beat Mr. L. F. Grape (Borax Consolidated, Ltd.), 3—6, 6—2, 6—2; semi-final, beat Mr. C. G. Copp (Doulton and Co., Ltd.), 6—3, 6—4; final, lost to Mr. C. C. Gough (Lever Brothers, Ltd.), 1—6, 6—3, 14—12, 2—6, 2—6.

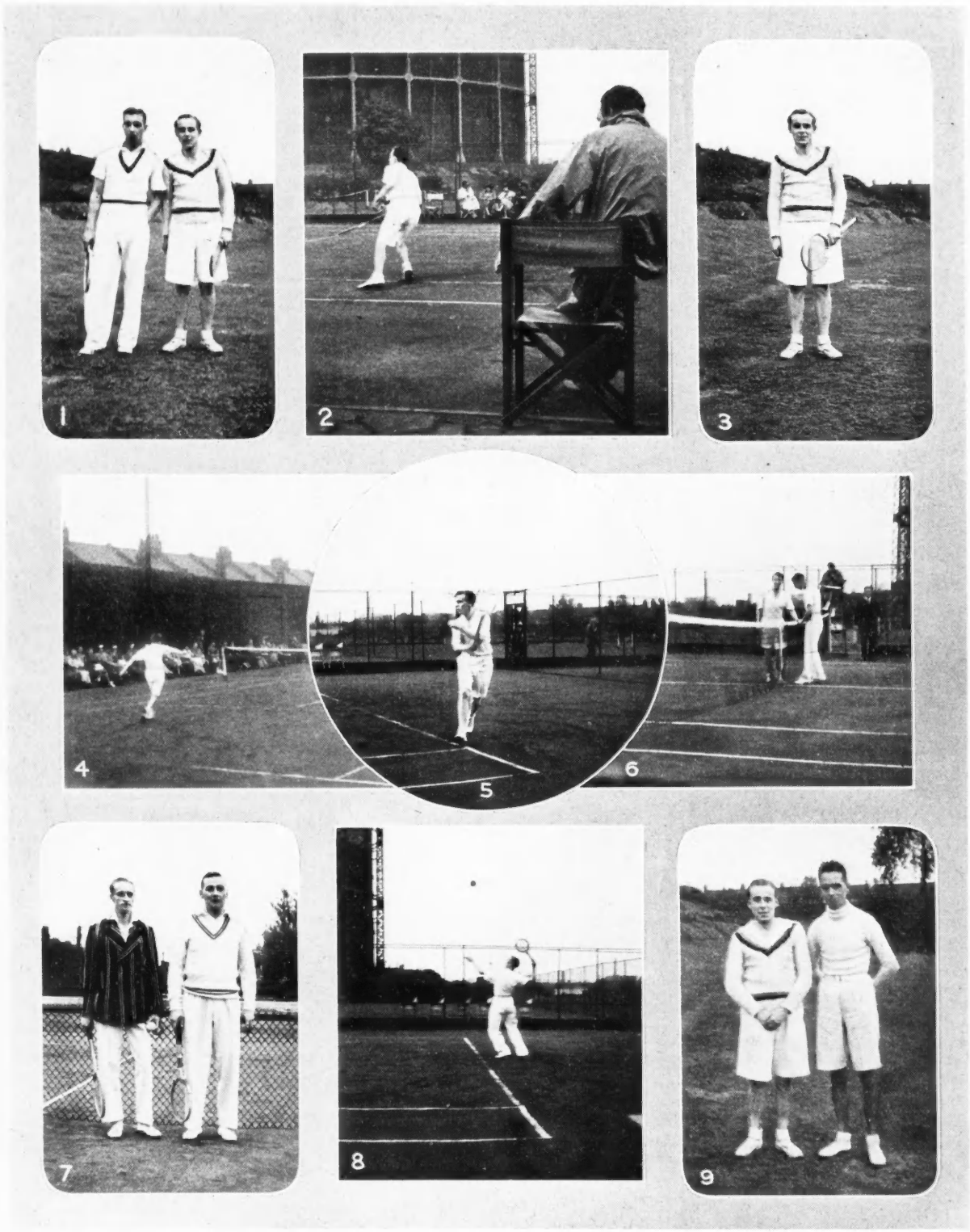
Messrs. GOUGH and WILLIAMS.—1st round, beat Messrs. E. J. Allday and J. W. Parkes (Bakelite, Ltd.), 6—2, 6—1; 2nd round, beat Messrs W. Speakman and S. E. Challoner (Monsanto Chemicals, Ltd.), 6—3, 2—6, 6—2; 3rd round, beat Messrs. J. H. Bennitt and J. E. H. Hayward (Bakelite, Ltd.), 6—1, 6—2; semi-final, beat Messrs. R. D. Hayman and C. G. Copp (Doulton and Co., Ltd.), 7—5, 8—6; final, drew with Messrs. A. E. C. Willshere and L. F. Grape (Borax Consolidated, Ltd.), 6—4, 8—7 (match abandoned).

Messrs. WILLSHERE and GRAPE.—1st round, beat Messrs. A. A. Killick and G. A. Brittain (B. Laporte, Ltd.), 6—1, 6—3; 2nd round, beat Messrs. A. W. White and R. H. Hornsby (Howards and Sons, Ltd.), 6—2, 6—0; 3rd round, beat Messrs. P. D. O'Brien and F. D. Hand (B. Laporte, Ltd.), 6—0, 6—1; semi-final, beat Messrs. V. J. Prosser and A. Baxter (John Haig, Ltd., and United Yeast Co., Ltd.), 6—2, 6—1; final, drew with Messrs. C. C. Gough and T. P. Williams (Lever Bros., Ltd.), 4—6, 7—8 (match abandoned).

By the hospitality of the Gas Light and Coke Company the players and guests were entertained to tea between the two matches in a large marquee adjoining the courts, and they reassembled there at the close of play for the presentation of the trophies.

Mr. JOHN BENN, a director of Benn Brothers, Ltd., proprietors of THE CHEMICAL AGE, handed the cups to the winners. He also presented the "Invicta" statuette (given by Thomas Hill-Jones, Ltd.) to Mr. Gough as the winner

Some Chemical Age Snapshots at East Ham



1.—Before the match. Mr. A. Baxter (United Yeast Co., Ltd.), and Mr. C. C. Gough (Lever Brothers, Ltd.). 2.—Mr. Gough in play. 3.—The winner of "The Chemical Age" silver challenge cup. 4 and 5.—Incidents during the match. 6.—The loser congratulating the winner at the close of play. 7.—Mr. L. F. Grape and Mr. A. E. C. Willshere (Borax Consolidated, Ltd.). 8.—"Service." 9.—Mr. C. C. Gough and Mr. T. P. Williams (Lever Brothers, Ltd.)

of the singles, and the "Lloyd Willey" statuette (given by Mr. W. Lloyd Willey) to Mr. Baxter as the runner-up. Corresponding prizes, given by the same donors, were handed to the four players in the doubles. Mr. Benn complimented the players upon their excellent play and referred to the increased popularity of THE CHEMICAL AGE tournament, as indicated by the greater number of entries received this year. Some of them might have seen an advertisement in a daily paper which read: "Well-known hotel requires immediately three waiters; must have tails." The day might come, Mr. Benn added, when the columns of THE CHEMICAL AGE would be packed with advertisements which would read: "Research chemist wanted; knowledge of chemistry an advantage, but must excel at tennis!" He thanked the Gas Light and Coke Company for placing their ground at the disposal of the tournament and for entertaining the guests to tea. He also thanked Mr. Lloyd Willey and his company for the gift of the statuettes and Mr. S. E. Monk (Beckton), captain of the Gas Light and Coke Company's tennis club, for kindly officiating as umpire.

Mr. Potter responded for the Gas Light and Coke Company and said it was a pleasure to entertain visitors at one of the company's many sports grounds in and around London.

Mr. Lloyd Willey also said a few words, and described THE CHEMICAL AGE tournament as one of the happiest events in the year in the chemical industry. THE CHEMICAL AGE was to be congratulated upon running the tournament year by year, and he had pleasure in offering to present the statuettes again for the 1937 tournament.

Personal Notes

MR. WILLIAM AITKENHEAD, for many years works manager of G. and J. Weir, Ltd., died at 13 Lockerbie Avenue, Newlands, Gasgow, on September 6.

MR. SAMUEL JAMES MOORE died suddenly at 86 Preston New Road, Blackburn, on September 7. He was manager of T. A. Ward and Co., manufacturing chemists, Blackburn.

SIR FREDERICK JOHN JONES, of Irnham Hall, Grantham, chairman of United Coke and Chemicals Co., Ltd., and a director of United Steel Companies, Ltd., who died on May 23, aged 82 years, left estate value £186,957.

ALDERMAN THOMAS BRADLEY ROWE, of Lafrewda, Exeter, of Rowe Brothers and Co., Ltd., lead and lead pipe manufacturers, Exeter and Bristol, a former Mayor and Sheriff of Exeter, left £131,185, with net personalty £126,144.

MR. JAMES KING WALKER, of 3 Queen's Park Avenue, Crosshill, Glasgow, of Pringle and Alexander, chemical manure manufacturers, 17 Waterloo Street, Glasgow, left £21,443.

MR. JOHN IRWIN, aged 74, managing director of the West Cumberland By-Products Co., Flimby, Maryport, and a noted chemist, died on September 12 at his home, Thaneville, Maryport.

MR. SHERARD OSBORN COWPER-COLES, who died at Sunbury-on-Thames on September 9 in his seventieth year, was an inventor who devised a method of galvanising iron and steel which he called the "sherardising" process. His father, Captain Cowper Phipps Coles, R.N., lost his life in H.M.S. Captain, which had been built to his designs and which turned bottom upwards in a fresh gale off Cape Finisterre on September 7, 1870, with the loss of nearly all on board. Captain Coles had devoted himself to the problem of defensive armour for ships, but the son was chiefly concerned with the electrodeposition of metals. He invented a number of electrolytic processes for making, among other uses, iron and copper tubes and sheets, for the recovery of zinc from its ores, and for aluminium welding without a flux. He claimed to be the originator of the electro-galvanising and chromium plating industries. Mr. Cowper-Coles was M.I.E.E., M.I.Mech.E., A.M.I.C.E., and a member of the Iron and Steel Institute, the American Institute of Electrical Engineers, the American Electro-Chemical Society, and the Society of Chemical Industry. He was a founder of the Faraday Society, and contributed many papers to technical institutions. At the Franco-British Exhibition of 1908 he was awarded the grand prix for electro-chemistry.

Chemical Notes from Foreign Sources

Finland

THE VAPOUR OF DIACETYL is reported to possess valuable bactericidal properties. It prevents the growth of tubercle bacilli, for instance, and kills off developed cultures ("Chemiker-Zeitung," August 12).

Poland

THE ASSOCIATION OF POLISH ENGINEERS recently decided to speed up preliminary work aiming at establishment of an aluminium and magnesium producing industry in the country.

SYNTHETIC CORUNDUM with an aluminium oxide content of 94-96 per cent. is now being manufactured by the "Zakludy Elektro" in Upper Lazisk (Upper Selesia).

Czechoslovakia

NEW LABORATORIES FOR RESEARCH into colour film photography have been established at Ruzyne, near Prague.

ACCORDING TO REPORTS IN THE PRESS the Spiritus-Verwertungsgesellschaft is accelerating its preliminary measures for trying out a Russian patented process for the production of rubber from crude spirit.

Switzerland

THE FORMATION IS ANNOUNCED of the A.G. fur Chemische and Technische Industriewerke, in Basle, with a capital of two million francs, the declared object being participation in chemical, technical and related industries. Among the directors are E. Zachmann (Basle), Hans Werenfels (Binningen), Jacques Schaer (Berne) and R. Peter (Arlesheim).

Germany

THE SCHERING KAHLBAUM A.G., for the year ending December 31, 1935, announce a net profit of 1,700,722 marks, of which 150,000 marks are set aside for the pensions fund, leaving 1,550,722 marks to be carried forward to the new account. It was stated that a good start has been made to the present year's trading with increased turnover both in respect of value and goods.

THE ASSOCIATION FOR STUDY OF ANTHRACITE CARBONISATION (Vereinigung zum Studium der Steinkohlenschwelung), which was recently established under the auspices of a number of Ruhr mining concerns, has now completed preliminary work and contemplates small-scale trials with the processes worked out by the firms of Berg and Co., Cologne, and Hinselmann Koksofenbau G.m.b.H., Essen.

Inventions in the Chemical Industry

THE following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under " Applications for Patents " are for reference in all correspondence up to the acceptance of the Complete Specification.

Specifications Open to Public Inspection

DISPERSION OF PIGMENTS.—E. I. du Pont de Nemours and Co. March 1, 1935. 2366/36.

MANUFACTURE OF NITROCELLULOSE.—Du Pont Viscoloid Co. March 2, 1935. 2367/36.

EXTRACTING TITANIUM COMPOUNDS FROM TITANIUM-CONTAINING ORE.—United Color and Pigment Co., Inc. March 4, 1935. 2524/36.

PREPARING NITRILES.—Armour and Co. March 6, 1935. 2960/36.

MANUFACTURE OF DYESTUFFS for esters of cellulose and products resulting therefrom.—Compagnie Nationale de Matieres Colorantes et Manufactures de Produits Chimiques du Nord Reunies Etablissements Kuhlmann. March 5, 1935. 4293/36.

LIQUID REFINERS and method for refining liquids.—J. K. Russell, W. B. Collins, and W. W. Boggs. March 4, 1935. 6063/36.

PRODUCTION OF CARBON-AMIDE ACIDS and their salts.—I. G. Farbenindustrie. March 1, 1935. 6144/36.

CHLOROHYDRINS.—Usines de Melle.—March 6, 1935. 6274/36.

GLYOXAL-SEMI-ACETALS.—H. Fischer. March 2, 1935. 6326/36.

STORAGE OF INFLAMMABLE OR EXPLOSIVE LIQUIDS.—K. Szilvay March 1, 1935. 6339/36.

PRODUCTION OF SUBSTANCES in the colloidal state.—J. Aumarechal. March 2, 1935. 6345/36.

STABILISATION OF ANIMAL AND VEGETABLE FATS and oils.—E. I. du Pont de Nemours and Co. March 5, 1935. 6588/36.

MANUFACTURE OF ARTIFICIAL LEATHER and the like.—Atlas Ago Chemische Fabrik A.-G. March 7, 1935. 6948/36.

DEGREASING OF METALLIC ARTICLES.—E. I. du Pont de Nemours and Co. March 7, 1935. 7086/36.

SULPHURISING ORGANIC COMPOUNDS having unsaturated linkages of an aliphatic character.—K. W. Posnansky, C. Sandvoss, and Dr. Alexander and Posnansky. March 26, 1934. 23985/36.

Specifications Accepted with Date of Application

PROCESS FOR HYDROGENATING HEAVY OILS to light oils and gaseous hydrocarbons and apparatus therefor.—V. Sauter, and F. Klonnek. Nov. 27, 1934. 452,860.

PROCESS FOR COKING LIQUID HYDROCARBONS and suspensions of carbonaceous materials in liquid hydrocarbons.—H. A. Brassert and Co., Ltd., and H. A. Brassert. Dec. 1, 1934. 452,916.

LUBRICANTS AND LUBRICATION.—C. Arnold (C. F. Prutton, and A. K. Smith). Dec. 29, 1934. 453,047.

MOTOR FUEL.—H. E. Potts (International Hydrogenation Patents Co., Ltd.). Jan. 1, 1935. 452,917.

SIZING FIBROUS MATERIALS.—W. W. Groves (I. G. Farbenindustrie). Jan. 28, 1935. 453,048.

ORGANIC COMPOUNDS containing acid salt-forming groups.—W. W. Groves (I. G. Farbenindustrie). Feb. 23, 1935. 452,866.

TREATING SUGAR.—P. Sanchez. April 9, 1934. 453,129.

MANUFACTURE OF SALTS of cyclic nitrogen bases.—I. G. Farbenindustrie. March 3, 1934. 452,868.

SULPHUR CEMENT.—W. W. Duecker. April 27, 1934. 453,202.

WATER-RESISTANT DEXTRINE PASTES.—International Patents Development Co. Sept. 29, 1934. 453,132.

TREATING SEAWEED for manufacturing purposes.—F. S. Arbuthnot, and J. S. Campbell. March 4, 1935. 453,204.

MANUFACTURE OF WETTING AND FOAMING AGENTS.—F. B. Dehn (Procter and Gamble Co.). March 4, 1935. (Sample furnished). 453,134.

PRODUCTS OF THE NATURE OF PETROLEUM KELLY.—I. G. Farbenindustrie. March 3, 1934. 453,139.

HYDRATED OLEFINES.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. March 5, 1934. 453,147.

UNDECYL COMPOUNDS and method for their production.—Carbide and Carbon Chemicals Corporation.—March 31, 1934. 453,151.

VAT-DYESTUFFS.—I. G. Farbenindustrie. March 7, 1934. 453,209.

SOLUTIONS OF POLLEN or other vegetable cells.—R. F. Hunwicke. March 7, 1935. (Addition to 425,216.) 453,159.

COMPOSITIONS FOR PRODUCING GAS for use in pressure-operated devices. J. Taylor, and Imperial Chemical Industries, Ltd. March 11, 1935. 453,210.

ALKYL HALIDES.—Coutts and Co., and F. Johnson (Legal representatives of J. Y. Johnson (deceased)). (I. G. Farbenindustrie). April 1, 1935. 452,934.

HYDROGENATING FATTY ACIDS.—Metagges, A.-G., and O. Brucke. July 1, 1935. 452,887.

PRODUCTION OF ALCOHOLS.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. July 7, 1934. 453,073.

THIXOTROPIC PREPARATIONS containing copper oxychloride and the products obtained thereby. P. Kubelka. July 12, 1935. 452,950.

TITANIUM PIGMENTS.—British Titan Products Co., Ltd. July 19, 1934. 453,188.

MANUFACTURE OF VEGETABLE OILS.—P. Ammann. Aug. 6, 1934. 452,892.

FIREPROOFING COMPOSITIONS.—V. J. Truro. May 19, 1936. 453,109.

LUBRICANTS AND LUBRICATION.—C. Arnold (C. F. Prutton and A. K. Smith). Dec. 29, 1934. 452,914.

LUBRICANTS AND LUBRICATION.—C. Arnold (C. F. Prutton and A. K. Smith). Dec. 29, 1934. 453,114-5.

Applications for Patents

(September 3 to 9 inclusive.)

MANUFACTURE OF SYNTHETIC RESIN COMPOSITIONS.—Brush and General Mouldings Manufacturing Co., Ltd., M. B. Rousset and A. V. Keeler. 24508.

MANUFACTURE OF CYCLOTETRAMETHYLENE SULPHONE.—A. Carpmael (I. G. Farbenindustrie). 24320.

PROCESS FOR DYEING LEATHER.—A. Carpmael (I. G. Farbenindustrie). 24526.

ORGANIC FERRO-COMPOUNDS.—F. B. Dehn (Chemische Fabrik Promonta Ges.). 24619.

MANUFACTURE OF SURFACE-ACTIVE MATERIALS.—E. I. du Pont de Nemours and Co. 24264.

PRODUCTION OF ALKYL ESTER SALTS.—H. D. Elkington (Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij). (June 27, '35.) 24638.

MANUFACTURE OF LEAD.—Goodlass Wall and Lead Industries, Ltd., B. Jones. 24538.

MANUFACTURE OF AZO-DYESTUFFS.—W. W. Groves (I. G. Farbenindustrie). 24491.

MANUFACTURE OF REDUCTO-DEHYDROCHOLIC ACID.—I. G. Farbenindustrie. 24145.

MANUFACTURE OF PIGMENT DYESTUFFS.—I. G. Farbenindustrie. (Germany, Sept. 6, '35.) 24407.

PROCESS FOR DYEING PELTS, ETC.—I. G. Farbenindustrie. (Germany, Oct. 12, '35.) 24594.

MANUFACTURE OF RUBBER ARTICLES.—Imperial Chemical Industries, Ltd., L. B. Morgan. 24157.

PRODUCTION OF PULVERULENT MATERIAL.—Imperial Chemical Industries, Ltd., H. J. Thurlow. 24265.

TREATMENT OF DYED, ETC., GOODS.—Imperial Chemical Industries, Ltd., J. G. Evans. 24267.

PREPARATION OF SEED PROTEINS.—Imperial Chemical Industries, Ltd., A. McLean. 24541, 24542.

RECOVERY OF SUBSTANCES in the form of small crystals which are stable in storage.—G. W. Johnson (I. G. Farbenindustrie.) 24388.

PRODUCTION OF NICKEL CARBONYL.—Mond Nickel Co., Ltd., A. E. Wallis. 24642.

PROCESS FOR TREATING HYDROCARBONS.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. (United States, May 18.) 24420.

PRODUCTION OF PIGMENTS containing zirconium dioxide.—L. Passerini. (Italy, Sept. 3, '35.) 24151.

DISTILLATION PLANT.—F. Puening. (Germany, Sept. 7, '35.) 24412.

MANUFACTURE OF THERAPEUTICALLY VALUABLE GOLD COMPOUNDS. Schering-Kahlbaum. (Germany, Sept. 13, '35.) 24247.

PROCESS FOR INTRODUCTION OF ARYL GROUPS into α-β-unsaturated carbonyl compounds and their derivatives.—Schering-Kahlbaum. (Germany, Sept. 17, '35.) 24321.

PRODUCTION OF ACYL COMPOUNDS OF POLYCYCLIC ALCOHOLS of the cyclopentano polyhydrophenanthrene series.—Schering-Kahlbaum. (March 4, '35.) 24527.

MANUFACTURE OF AZO-DYESTUFFS.—Soc. of Chemical Industry in Basle. (Switzerland, Sept. 7, '35.) 24377. (Switzerland, Aug. 4.) 24378.

MANUFACTURE OF SULPHURIC ACID.—W. W. Triggs (Soc. Générale Metallurgique de Hoboken). 24410.

WELDING.—Union Carbide and Carbon Research Laboratories, Inc. (United States, Nov. 5, '35.) 24105.

PRODUCTION OF ACYL COMPOUNDS of polycyclic alcohols of the cyclopentano polyhydro-phenanthrene series.—W. P. Williams. (March 4, '35.) 24527.

Books Received

Industrial Chemical Calculations. By O. A. Hougen and K. M. Watson. London: Chapman and Hall, Ltd. New York: John Wiley and Sons, Inc. Pp. 487. 22s. 6d.

The Chemistry of the Colloidal State. By John C. Ware. London: Chapman and Hall, Ltd. New York: John Wiley and Sons, Inc. Pp. 334. 18s. 6d.

Weekly Prices of British Chemical Products

WITH the exception of an increase of 3d. per gallon in the price of pyridine, the prices of heavy chemicals have remained unchanged during the week. Unless otherwise stated the prices quoted below are for fair quantities net and naked at sellers' works.

MANCHESTER.—Steady price conditions have obtained in virtually all sections of the Manchester chemical market and whilst actual advances have been few in number—the lead products have been outstanding in this respect during the past week—instances of any indication of easiness are rare. In some quarters a little more inquiry has been reported both in respect of spot lots and in connection with contracts for delivery over the last few months of the year and a moderate amount of new business has been booked. With the close of the holiday season, deliveries of chemicals into consumption in the Lancashire and West Yorkshire areas are more closely approaching normal aggregate dimensions and sellers have relatively little of which to complain from this point of view. The by-products market this week has been moderately active and price changes have been slight.

GLASGOW.—There has been a further slight improvement in the demand for chemicals for home trade during the week, but export inquiries still remain limited. Prices generally continue firm at about previous figures, zinc, copper and lead products being very firm, and red lead and white lead prices have been advanced £1 per ton. With the exception of a little easing of washed oil prices, there have been no noteworthy changes in quotations for coal tar products over the week. Standard creosote is about normal for the season. High tar acid content oils, like cresylic acid, are in steady demand, with prices well maintained. Actually very little new business in either of these products has been booked, although consignments are moving regularly against existing commitments. Pitch remains quiet. Standard motor benzol is offered in the market at 1s. 2d. to 1s. 3d. in buyers' tank wagons. Pyridine 90/160 appears to be in demand greater than present local supplies, and inquiries continue to come in. Other refined fractions are steady as last reported.

General Chemicals

ACETONE.—£62 to £65 per ton; SCOTLAND: £64 to £65 ex wharf, according to quantity.

ACID, ACETIC.—Tech., 80%, £30 5s. to £32 5s. per ton; pure 80%, £32 5s. to £34 5s.; tech., 40%, £16 12s. 6d. to £18 12s. 6d.; tech., 60%, £23 10s. to £25 10s. SCOTLAND: Glacial 98/100%, £48 to £52; pure 80%, £32 5s.; tech., 80%, £30 5s., d/d buyers' premises Great Britain. MANCHESTER: 80%, commercial, £30 5s.; tech. glacial, £42 to £46.

ACID, BORIC.—Commercial granulated, £27 per ton; crystal, £28; powdered, £29; extra finely powdered, £31; packed in 1-cwt. bags, carriage paid home to buyers' premises within the United Kingdom in 1-ton lots. B.P. cryst., £36; B.P. powder, £37. SCOTLAND: Crystals, in 1 cwt. bags, £28; powdered, in 1 cwt. bags, £29.

ACID, CHROMIC.—Flaked, 10d. per lb., less 2½%; ground, 10¼d. per lb., less 2½%, d/d U.K.

ACID, CITRIC.—1s. per lb. MANCHESTER: 11¾d. to 1s. SCOTLAND: B.P. crystals, 1s. per lb., less 5%.

ACID, CRESYLIC.—97/99%, 3s. to 3s. 1d. per gal.; pale, 98%, 3s. 1d. to 3s. 2d.; dark, 2s. 6d. to 2s. 7d.; 99/100%, refined, 3s. 4d. to 3s. 6d. per gal. MANCHESTER: 99/100%, pale, 3s. 7d.

ACID, FORMIC.—85%, in carboys, ton lots, £42 to £47 per ton.

ACID, HYDROCHLORIC.—Spot, 4s. to 6s. carboy d/d according to purity, strength and locality. SCOTLAND: Arsenical quality, 4s.; dearsenicated, 5s. ex works, full wagon loads.

ACID, LACTIC.—LANCASHIRE: Dark tech., 50% by vol., £24 10s. per ton; 50% by weight, £28 10s.; 80% by weight, £50: pale tech., 50% by vol., £28; 50% by weight, £33; 80% by weight, £55; edible, 50% by vol., £41. One-ton lots ex works, barrels free.

ACID, NITRIC.—80° Tw. spot, £18 to £25 per ton makers' works. SCOTLAND: 80°, £24 ex station full truck loads.

ACID, OXALIC.—£48 15s. to £57 10s. per ton, according to packages and position. SCOTLAND: £2 10s. per cwt. in casks. MANCHESTER: £49 to £54 per ton ex store.

ACID, SULPHURIC.—SCOTLAND: 144° quality, £3 12s. 6d.; 168°, £7; dearsenicated, 20s. per ton extra.

ACID, TARTARIC.—1s. per lb. less 5%, carriage paid for lots of 5 cwt. and upwards. SCOTLAND: 11¾d. less 5%. MANCHESTER: 11¾d. to 1s. per lb.

ALUM.—SCOTLAND: Ground, £10 2s. 6d. per ton; lump, £9 12s. 6d.

ALUMINA SULPHATE.—LONDON: £7 10s. to £8 per ton. SCOTLAND: £7 to £8 ex store.

AMMONIA, ANHYDROUS.—Spot, 10d. per lb. d/d in cylinders. SCOTLAND: 10d. to 1s. containers extra and returnable.

AMMONIA, LIQUID.—SCOTLAND: 80°, 2½d. to 3d. per lb., d/d.

AMMONIUM BICHROMATE.—8d. per lb. d/d U.K.

AMMONIUM CARBONATE.—SCOTLAND: Lump, £30 per ton; powdered, £33, in 5-cwt. casks d/d buyers' premises U.K.

AMMONIUM CHLORIDE.—LONDON: Fine white crystals, £18 to £19. (See also Salammoniac.)

AMMONIUM CHLORIDE (MURIATE).—SCOTLAND: British dog tooth crystals, £32 to £35 per ton carriage paid according to quantity. (See also Salammoniac.)

AMMONIUM SULPHATE.—Neutral quality, 20.6% nitrogen, £6 16s. per ton.

ANTIMONY OXIDE.—SCOTLAND: £61 to £65 per ton, c.i.f. U.K. ports.

ANTIMONY SULPHIDE.—Golden, 6½d. to 1s. 1d. per lb.; crimson, 1s. 5½d. to 1s. 7d. per lb., according to quality.

ARSENIC.—LONDON: £13 10s. per ton c.i.f. main U.K. ports for imported material; Cornish nominal, £22 10s. f.o.r. mines. SCOTLAND: White powdered, £17 10s. ex store. MANCHESTER: White powdered Cornish £19 ex store.

ARSENIC SULPHIDE.—Yellow, 1s. 5d. to 1s. 7d. per lb.

BARIUM CHLORIDE.—LONDON: £10 10s. per ton. SCOTLAND: £11.

BARYTES.—£6 10s. to £8 per ton.

BISULPHITE OF LIME.—£6 10s. per ton f.o.r. London.

BLEACHING POWDER.—Spot, 35/37%, £7 19s. per ton in casks, special terms for contracts. SCOTLAND: £9.

BORAX. COMMERCIAL.—Granulated, £14 10s. per ton; crystal, £15 10s.; powdered, £16; finely powdered, £17; packed in 1-cwt. bags, carriage paid home to buyer's premises within the United Kingdom in 1-ton lots. SCOTLAND: Granulated, £14 10s. per ton in 1 cwt. bags, carriage paid.

CADMIUM SULPHIDE.—3s. 8d. to 3s. 11d. per lb.

CALCIUM CHLORIDE.—Solid 70/75% spot, £5 5s. per ton d/d station in drums. SCOTLAND: £5 10s. per ton net ex store.

CARBON BISULPHIDE.—£31 to £33 per ton, drums extra.

CARBON BLACK.—3¾d. to 4¾d. per lb. LONDON: 4½d. to 5d.

CARBON TETRACHLORIDE.—SCOTLAND: £41 to £43 per ton, drums extra.

CHROMIUM OXIDE.—10¾d. per lb., according to quantity d/d U.K.; green, 1s. 2d. per lb.

CHROMETAN.—Crystals, 2⅜d. per lb.; liquor, £19 10s. per ton d/d

COPPERAS (GREEN).—SCOTLAND: £3 15s. per ton, f.o.r. or ex works.

CREAM OF TARTAR.—£3 19s. per cwt. less 2½%. LONDON: £3 17s. per cwt. SCOTLAND: £3 18s. net.

DINITROTOLUENE.—66/68° C., 9d. per lb.

DIPHENYLGUANIDINE.—2s. 2d. per lb.

FORMALDEHYDE.—LONDON: £24 10s. per ton. SCOTLAND: 40%, £25 to £28 ex store.

IODINE.—Resublimed B.P., 6s. 3d. to 8s. 4d. per lb.

LAMPBLACK.—£24 to £26 per ton.

LEAD ACETATE.—LONDON: White, £33 15s. per ton; brown, £1 per ton less. SCOTLAND: White crystals, £34 to £35; brown, £1 per ton less. MANCHESTER: White, £34 10s., brown £33 10s.

LEAD NITRATE.—£32 10s. to £34 10s. per ton.

LEAD, RED.—SCOTLAND: £32 10s. per ton less 2½%, carriage paid, for 2-ton lots.

LEAD, WHITE.—SCOTLAND: £40 per ton, carriage paid. LONDON: £41.

LITHOPONE.—30%, £16 to £16 5s. per ton.

MAGNESITE.—SCOTLAND: Ground calcined, £9 per ton, ex store.

MAGNESIUM CHLORIDE.—SCOTLAND: £6 17s. 6d. per ton.

MAGNESIUM SULPHATE.—Commercial, £5 per ton, ex wharf.

METHYLATED SPIRIT.—61 O.P. industrial, 1s. 5d. to 2s. per gal.; pyridinised industrial, 1s. 7d. to 2s. 2d.; mineralised, 2s. 6d. to 3s. Spirit 64 O.P. is 1d. more in all cases and the range of prices is according to quantities. SCOTLAND: Industrial 64 O P., 1s. 9d. to 2s. 4d.

PARAFFIN WAX.—SCOTLAND: 3⅝d. per lb.

PHENOL.—6¾d. to 7¼d. per lb.

POTASH, CAUSTIC.—LONDON: £42 per ton. MANCHESTER: £38 10s.

POTASSIUM BICHROMATE.—Crystals and Granular, 5d. per lb. less 5%, d/d U.K. Ground, 5¼d. LONDON: 5d. per lb. less 5%, with discounts for contracts. SCOTLAND: 5d. per lb. less 5% carriage paid. MANCHESTER: 5d.

POTASSIUM CHLORATE.—LONDON: £37 to £40 per ton. SCOTLAND: 4¼d. per lb. MANCHESTER: £39 per ton.

POTASSIUM CHROMATE.—6¼d. per lb. d/d U.K.

POTASSIUM IODIDE.—B.P., 5s. 2d. per lb.

POTASSIUM NITRATE.—SCOTLAND: Refined granulated, £29 per ton c.i.f. U.K. ports. Spot, £30 per ton ex store.

POTASSIUM PERMANGANATE.—LONDON: 8¼d. per lb. SCOTLAND: B.P. Crystals 8¾d. MANCHESTER: B.P. 10½d. to 11½d.

POTASSIUM PRUSSIATE.—LONDON: Yellow, 7½d. to 8d. per lb. SCOTLAND: 7½d. net, ex store. MANCHESTER: Yellow, 8¼d. to 8½d.

SALAMMONIAC.—First lump spot, £41 17s. 6d. per ton d/d in barrels. SCOTLAND: Large crystals, in casks, £36.

SODA ASH.—58% spot, £5 12s. 6d. per ton f.o.r. in bags.

SODA, CAUSTIC.—Solid, 76/77° spot, £13 17s. 6d. per ton d/d station. SCOTLAND: Powdered 98/99%, £17 10s. in drums, £18 5s. in casks, Solid 76/77°, £14 12s. 6d. in drums; 70/73%,

£14 12s. 6d., carriage paid buyer's station, minimum 4-ton lots; contracts 10s. per ton less. MANCHESTER: £13 5s. to £14 contracts.

SODA CRYSTALS.—Spot, £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.

SODIUM ACETATE.—LONDON: £21 per ton. SCOTLAND: £17 15s. per ton net ex store.

SODIUM BICARBONATE.—Refined spot, £10 10s. per ton d/d station in bags. SCOTLAND: £12 10s. per ton in 1 cwt. kegs, £10 15s. per ton in 2 cwt. bags. MANCHESTER: £10 10s.

SODIUM BICHROMATE.—Crystals cake and powder 4d. per lb. net d/d U.K. discount 5%. Anhydrous, 5d. per lb. LONDON: 4d. per lb. less 5% for spot lots and 4d. per lb. with discounts for contract quantities. MANCHESTER: 4d. per lb. SCOTLAND: 4d., less 5% carriage paid.

SODIUM BISULPHITE POWDER.—60/62%, £20 per ton d/d 1 cwt. iron drums for home trade.

SODIUM CARBONATE, MONOHYDRATE.—£15 per ton d/d in minimum ton lots in 2 cwt. free bags. Soda crystals, SCOTLAND: £5 to £5 5s. per ton ex quay or station. Powdered or pea quality, 7s. 6d. per ton extra. Light Soda Ash, £7 ex quay, min. 4-ton lots with reductions for contracts.

SODIUM CHLORATE.—£29 per ton. SCOTLAND: £1 10s. per cwt.

SODIUM CHROMATE.—4d. per lb. d/d U.K.

SODIUM HYPOSULPHITE.—SCOTLAND: Large crystals English manufacture, £9 5s. per ton ex stations, min. 4-ton lots. Pea crystals, £14 10s. ex station, 4-ton lots. MANCHESTER: Commercial, £10 5s.; photographic, £14 10s.

SODIUM IODIDE.—B.P., 6s. per lb.

SODIUM METASILICATE.—£14 per ton, d/d U.K. in cwt. bags.

SODIUM NITRITE.—LONDON: Spot, £18 5s. to £20 5s. per ton d/d station in drums.

SODIUM PERBORATE.—10%, 9¼d. per lb. d/d in 1-cwt. drums. LONDON: 10d. per lb.

SODIUM PHOSPHATE.—£13 per ton.

SODIUM PRUSSIATE.—LONDON: 5d. to 5½d. per lb. SCOTLAND: 5d. to 5¾d. ex store. MANCHESTER: 5d. to 5½d.

SODIUM SILICATE.—140° Tw. Spot, £8 per ton. SCOTLAND: £8 10s.

SODIUM SULPHATE (GLAUBER SALTS).—£4 2s. 6d. per ton d/d SCOTLAND: English material, £3 15s.

SODIUM SULPHATE (SALT CAKE).—Unground spot, £3 12s. 6d. per ton d/d station in bulk. SCOTLAND: Ground quality, £3 5s. per ton d/d. MANCHESTER: £3 2s. 6d. to £3 5s.

SODIUM SULPHIDE.—Solid 60/62% Spot, £10 15s. per ton d/d in drums; crystals 30/32%, £8 per ton d/d in casks. SCOTLAND: For home consumption, Solid 60/62%, £10 5s.; broken 60/62%, £11 5s.; crystals, 30/32%, £8 7s. 6d., d/d buyer's works on contract, min. 4-ton lots. Spot solid, 5s. per ton extra. Crystals, 2s. 6d. per ton extra. MANCHESTER: Concentrated solid, 60/62%, £11; commercial, £8.

SODIUM SULPHITE.—Pea crystals, spot, £13 10s. per ton d/d station in kegs. Commercial spot, £8 15s. d/d station in bags.

SULPHATE OF COPPER.—MANCHESTER: £15 per ton f.o.b. SCOTLAND: £16 10s. per ton less 5%.

SULPHUR.—£9 to £9 5s. per ton. SCOTLAND: £8 to £9.

SULPHUR CHLORIDE.—5d. to 7d. per lb., according to quality.

SULPHUR PRECIP.—B.P., £55 to £60 per ton according to quantity. Commercial, £50 to £55.

VERMILION.—Pale or deep, 5s. 1d. per lb. in 1-cwt. lots.

ZINC CHLORIDE.—SCOTLAND: British material, 98%, £18 10s. per ton f.o.b. U.K. ports.

ZINC SULPHATE.—LONDON: £12 per ton. SCOTLAND: £10 10s.

ZINC SULPHIDE.—10d. to 11d. per lb.

Nitrogen Fertilisers

SULPHATE OF AMMONIA.—September, £6 16s. per ton; October, £6 17s. 6d.; November, £6 19s.; December, £7 0s. 6d. for neutral quality basis 20.6% nitrogen delivered in 6-ton lots to farmer's nearest station.

CALCIUM CYANAMIDE.—September, £6 16s. 3d. per ton; October, £6 17s. 6d.; November, £6 18s. 9d.; December, £7; carriage paid to any railway station in Great Britain in lots of 4 tons and over.

NITRO-CHALK.—£7 5s. per ton to end of September.

NITRATE OF SODA.—£7 12s. 6d. per ton to end of September.

CONCENTRATED COMPLETE AND AMMONIUM PHOSPHATE FERTILISERS £10 12s. to £11 1s. per ton, according to specification. N.P. fertilisers £10 5s. to £13 15s. per ton for minimum 6-ton lots delivered buyer's nearest station.

Coal Tar Products

ACID, CRESYLIC.—97/99%, 3s. to 3s. 1d. per gal.; 99/100%, 3s. 4d. to 4s. per gal., according to specification; pale 98%, 3s. to 3s. 1d.; dark, 2s. 4d. to 2s. 5d. GLASGOW: Pale, 99/100%, 2s. 9d. to 3s. 3d. per gal.; pale, 97/99%, 2s. 6d. to 2s. 9d.; dark, 97/99%, 2s. 3d. to 2s. 4d.; high boiling acids, 1s. 8d. to 2s.; American specification, 2s. 9d. to 3s.

ACID, CARBOLIC.—Crystals, 6¾d. to 7½d. per lb.; crude, 60's, 2s. 3d. to 2s. 6d. per gal. MANCHESTER: Crystals, 6¾d. per lb.; crude, 2s. 7d. to 2s. 8d. per gal. GLASGOW: Crude, 60's, 2s. 4d. to 2s. 6d. per gal.; distilled, 60's, 2s. 8d. to 3s.

BENZOL.—At works, crude, 8½d. to 9d. per gal.; standard motor 1s. 2d. to 1s. 2¼d.; 90%, 1s. 3d. to 1s. 3¼d.; pure, 1s. 7d. to 1s. 7½d. LONDON: Motor, 1s. 3¼d. GLASGOW: Crude, 8½d. to 9d. per gal.; motor, 1s. 2d. to 1s. 3d.

CREOSOTE.—B.S.I. Specification standard, 5½d. per gal. f.o.r. Home, 3¾d. d/d. LONDON: 4¼d. f.o.r. North: 5d. London. MANCHESTER: 4¾d. to 5¼d. GLASGOW: B.S.I. Specification, 5¼d. to 5¾d. per gal.; washed oil, 4¼d. to 4¾d.; lower sp. gr. oils, 4¾d. to 5d.

NAPHTHA.—Solvent, 90/100%, 1s. 5½d. to 1s. 6½d. per gal.; 95/160%, 1s. 7d.; 90%, 1s. to 1s. 2d. LONDON: Solvent, 1s. 3½d. to 1s. 4d.; heavy, 11d. to 1s. 0½d. f.o.r. GLASGOW. Crude, 5½d. to 6d. per gal.; 90% 160, 1s. 4d. to 1s. 5d.; 90% 190, 1s. to 1s. 1d.

NAPHTHALENE.—Crude, whizzed or hot pressed, £12 to £13 per ton; purified crystals, £22 10s. per ton in 2-cwt. bags. LONDON: Fire lighter quality, £5 to £5 10s. per ton; crystals, £27 to £27 10s. GLASGOW: Fire lighter, crude, £7 to £8 per ton (bags free).

PYRIDINE.—90/140%, 6s. to 7s. 3d. per gal.; 90/180, 2s. 3d. GLASGOW: 90% 140, 6s. to 6s. 6d. per gal.; 90% 160, 5s. to 5s. 6d.; 90% 180, 2s. 6d.

TOLUOL.—90%, 1s. 11d. per gal.; pure, 2s. 3d. GLASGOW: 90% 120, 1s. 10d. to 1s. 11d. per gal.

XYLOL.—Commercial, 2s. per gal.; pure, 2s. 2d. GLASGOW: Commercial, 1s. 11d. to 2s. per gal.

PITCH.—Medium, soft, 35s. per ton, in bulk at makers' works. MANCHESTER: 32s. 6d. f.o.b., East Coast. GLASGOW: f.o.b. Glasgow, 30s. to 35s. per ton; in bulk for home trade, 32s. 6d.

Wood Distillation Products

ACETATE OF LIME.—Brown, £8 to £8 10s. per ton; grey, £10 5s. to £10 15s. Liquor, brown, 30° Tw., 8d. per gal. MANCHESTER: Brown, £9; grey, £10 10s.

CHARCOAL.—£5 to £10 per ton, according to grade and locality.

METHYL ACETONE.—40-50%, £45 to £48 per ton.

WOOD CREOSOTE.—Unrefined 6d. to 1s. 6d. per gal., according to boiling range.

WOOD, NAPHTHA, MISCIBLE.—2s. 9d. to 3s. 3d. per gal.; solvent, 3s. 9d. per gal.

WOOD TAR.—£2 to £2 10s. per ton.

Intermediates and Dyes

ACID, BENZOIC, 1914 B.P. (ex toluol).—1s. 9¼d. per lb. d/d buyer's works.

ACID, GAMMA.—Spot, 4s. per lb. 100% d/d buyer's works.

ACID, H.—Spot, 2s. 4¼d. per lb. 100% d/d buyer's works.

ACID NAPHTHIONIC.—1s. 8d. per lb.

ACID, NEVILLE AND WINTHER.—Spot, 3s. per lb. 100%.

ACID, SULPHANILIC.—Spot, 8d. per lb. 100%, d/d buyer's works.

ANILINE OIL.—Spot, 8d. per lb., drums extra, d/d buyer's works.

ANILINE SALTS.—Spot, 8d. per lb. d/d buyer's works, casks free.

BENZIDINE, HCl.—2s. 5d. per lb., 100% as base, in casks.

***o*-CRESOL 30/31° C.**—6d. per lb. in 1-ton lots.

***p*-CRESOL 34-5° C.**—1s. 6d. per lb. in ton lots.

***m*-CRESOL 98/100%.**—1s. 7d. per lb. in ton lots.

DICHLORANILINE.—1s. 11½d. to 2s. 3d. per lb.

DIMETHYLANILINE.—Spot, 1s. 6d. per lb., package extra.

DINITROBENZENE.—8d. per lb.

DINITROTOLUENE.—48/50° C., 9d. per lb.; 66/68° C., 10½d.

DINITROCHLORBENZENE, SOLID.—£72 per ton.

DIPHENYLAMINE.—Spot, 2s. per lb., d/d buyer's works.

α-NAPHTHOL.—Spot, 2s. 4d. per lb., d/d buyer's works.

β-NAPHTHOL.—In bags, £88 15s. per ton; in casks, £89 15s.

α-NAPHTHYLAMINE.—Lumps, 1s. per lb.; ground, 1s. 0½d.

β-NAPHTHYLAMINE.—Spot, 2s. 9d. per lb., d/d buyer's works in casks.

***o*-NITRANILINE.**—3s. 11d. per lb.

***m*-NITRANILINE.**—Spot, 2s. 7d. per lb., d/d buyer's works.

***p*-NITRANILINE.**—Spot, 1s. 8d. per lb., d/d buyer's works.

NITROBENZENE.—Spot, 4½d. to 5d. per lb.; 5-cwt. lots, drums extra.

NITRONAPHTHALENE.—9d. per lb.; P.G., 1s. 0½d. per lb.

SODIUM NAPHTHIONATE.—Spot, 1s. 9d. per lb.

***o*-TOLUIDINE.**—9½d. to 11d. per lb.

***p*-TOLUIDINE.**—1s. 11d. per lb.

***m*-XYLIDINE ACETATE.**—4s. 3d. per lb., 100%.

Latest Oil Prices

LONDON, Sept. 16.—LINSEED OIL was firm. Spot, £28 (small quantities); Oct. to May-Aug., £25 10s., naked. SOYA BEAN OIL was steady. Oriental (bulk), spot, Rotterdam, £24 10s. RAPE OIL was slow. Crude, extracted, £34 10s.; technical refined, £35 10s., naked, ex wharf. COTTON OIL was quiet. Egyptian crude, £29; refined common edible, £32 10s.; deodorised, £34 10s., naked, ex mill (small lots, £1 10s. extra). TURPENTINE was easy. American, spot, 39s. per cwt.

HULL.—LINSEED OIL, spot, quoted £26 per ton; Sept. and Oct.-Dec., £25 12s. 6d.; Jan.-April, £25 10s. COTTON OIL, Egyptian, crude, spot, £29; edible, refined, spot, £31 10s.; technical, spot, £31 10s.; deodorised, £33 10s., naked. PALM KERNEL OIL, crude, f.m.q., spot, £25 10s., naked. GROUNDNUT OIL, extracted, spot, £34; deodorised, £37. RAPE OIL, extracted, spot, £33 10s.; refined £34 10s. SOYA OIL, extracted, spot, £30; deodorised, £33 per ton. COD OIL, f.o.r. or f.a.s., 25s. per cwt., in barrels. CASTOR OIL, pharmaceutical, 43s. per cwt.; firsts, 38s.; seconds, 36s. TURPENTINE, American, spot, 41s. 6d. per cwt.

From Week to Week

A MEMBER OF HEREFORD ST. JOHN AMBULANCE BRIGADE became a casualty when assisting in an anti-gas demonstration on September 14.

THE NORWEGIAN HYDRO, it is reported, has reached an agreement to purchase the pulp factory of the Totens Cellulosafabrik. The Totens produces sulphite pulp by the Cross-Engelstad method.

THE TWELFTH INTERNATIONAL EXHIBITION OF INVENTIONS organised by the Institute of Patentees will be opened at the Central Hall, Westminster, on September 30, and will remain open until October 10.

A LARGE PLANT for the production of sulphuric acid on the Moritz system has just been completed at King's Lynn. We hope to publish an illustrated description of the installation in an early issue of THE CHEMICAL AGE.

THE 45TH CHEMISTS' EXHIBITION will be held from September 21 to 25, at the New Hall of the Royal Horticultural Society, Westminster, S.W. The exhibition is organised by the British and Colonial Druggists, Ltd., 194-200 Bishopsgate, E.C.

FROM SEPTEMBER 22 the offices of the Import Duties Advisory Committee will be at Shell-Mex House, Strand, London, W.C.2. Telephone No.: Temple Bar 7755. Telegrams: Impoduty, Rand, London.

THE ST. AUSTELL FIRE BRIGADE WERE SUMMONED to the North Goonbarrow china clay works last week, to extinguish an outbreak at the power station. It appears that a quantity of oil had ignited and the flames spread to the doors and roof. The King, when Prince of Wales, visited these works three years ago.

AT THE BUILDING TRADES EXHIBITION, which is being held at the Olympia from September 16 to 30, the British Oxygen Co., Ltd., is demonstrating the utility of oxygen and dissolved acetylene in the building trades. Details of the applications of the equipment exhibited will be supplied on request to the company.

THE ROYAL TECHNICAL COLLEGE, Glasgow, has issued its calendar for 1936-37, a 490-page volume containing a complete list of the educational facilities afforded at the college. In the chemistry and technical chemistry departments some twenty courses of lectures have been arranged for the session. In addition there are numerous practical courses.

THE MINISTER OF AGRICULTURE and the Secretary of State for Scotland have appointed Mr. F. J. Wrottesley, K.C., to hold a public inquiry into objections received to the sugar beet marketing scheme. The hearing will be opened at 10.15 a.m., on October 8, at Middlesex Guildhall, Westminster, S.W.1. The inquiry will be conducted in accordance with the Agricultural Marketing (Public Inquiry) (Great Britain) Rules, 1932.

THE IMPORT DUTIES ADVISORY COMMITTEE has received an application for an increase in the import duty on transparent cellulose wrapping. Any representations which interested parties may desire to make in regard to this application should be addressed in writing to the Secretary, Import Duties Advisary Committee, Caxton House (West Block), Tothill Street, Westminster, London, S.W.1, not later than October 8.

THE OFFER OF THE DUNLOP RUBBER CO., LTD., to acquire the assets of the India Tyre and Rubber Co., Ltd., Inchinnan, was approved at a special meeting of the shareholders in Glasgow on Monday. Mr. H. A. Holmes, chairman, said the effect of the offer was that the company would pay the shareholders 27s. 6d. in cash for each preference share and 3s. 3d. in cash for each ordinary share. It was intended to continue production at Inchinnan and if possible to extend the business. The name of the company would be retained.

THE LOCHABER DISTRICT VALUATION APPEAL COURT, at Fort William, on September 11, rejected the appeal of the British Aluminium Co. against the County Assessor's new valuation of the part of their Kinlochleven works situated in Inverness-shire. These include the Blackwater dam, valued at £5,000, and part of the Loch Eildo Mhor conduit and dam, valued at £2,742—a total gross valuation of £7,742. The present value of these subjects was stated to be £775, representing one-half per cent. of the capital value of the part of the Kinlochleven works situated in Inverness-shire.

NOTICES WERE POSTED AT THE UPHALL WORKS of Scottish Oils, Ltd., on Monday, to the effect that the factory would be closed down at the end of this month. More than 130 men will lose employment and about three-quarters of the male working population of the village will be unemployed. An official of Scottish Oils stated that the refining work being carried on at Uphall will in future be done at Grangemouth, where the plant has never been worked to capacity. It is possible that a few of the displaced men may be taken on at Pumpherston works. The closing of the works is quite unexpected, because only two years ago a new plant was installed.

THE CERAMIC SOCIETY will hold its first meeting of the session on Monday, September 21, at 7.30 p.m., in the North Staffordshire Technical College, Stoke-on-Trent. Mr. A. S. W. Odelberg, of the Gustafsberg Pottery, Sweden, will give an address.

THE FARADAY SOCIETY WILL MEET in the Chemistry Theatre at Edinburgh University from September 24 to 26. On the opening day there will be a general discussion on "Structure and Molecular Forces in Pure Liquids and Solutions."

THE ADDRESS of the Bausch and Lomb Optical Co., Ltd., was erroneously given in their advertisement in last week's issue as 67 Hatton Garden, E.C.1. Their new address is Africa House, Kingsway, W.C.2. (Telephone: Holborn 6604.)

COAL AND ALLIED INDUSTRIES, LTD., announce that the first commercial production of petrol of highest quality, having an octane number of 99, has been produced at the Seaham Harbour works of the company, and the first 30,000 gallons has been sold and will be delivered over the next thirty days.

A FIRE OCCURRED ON THURSDAY MORNING at the South Western Tar Distilleries of Forbes, Abbott and Lennard, at Kingston, Shoreham. A still of 2,000 gallons of tar boiled over and caught alight. Firemen waded through streams of hot tar and faced volumes of fumes in their efforts to extinguish the flames, which they prevented from reaching adjacent tanks.

THE HOFIUS PROCESS FOR PRESERVING MILK, in which the milk is stored in a pressure vessel with 10 atmospheres of oxygen at 43° F., and withdrawn as required, is described in a recent issue of the "Journal of the Ministry of Agriculture." Milk, so treated, will remain sweet for weeks, the oxygen effectively checking the growth of bacteria. The process has been used for some time in Continental countries.

AN INDEPENDENT COMPANY, Stelcon (Industrial Floors), Ltd., has been formed for the sale in Great Britain and overseas of Stelcon anchor steel plates and Stelcon steel-clad flags, which for the past ten years have been handled by Langley (London), Ltd. The new company's address is: Cliffords Inn, London, E.C.4. Mr. F. A. Langley and Mr. T. Kilburn are directors, and the staff has been recruited from Langley (London), Ltd.

THE APPEAL of the Chemical Council for an endowment fund for the publication of new knowledge, the maintenance of the chemical library, and eventually for securing suitable premises, has been issued to a large number of companies and firms which have derived direct benefit from chemistry. So far, the receipts and promises for the fund amount to over £19,200. Copies of the appeal can be obtained from the hon. secretary, The Chemical Council, 30 Russell Square, London, W.C.1.

THE RIVERSTOWN AND CARRICKMACROSS INDUSTRIAL ALCOHOL FACTORIES in the Irish Free State will be working early next month. Five factories in all, are being built; the remaining three will be in operation before the end of the year. For the present the operation of the distilleries will be purely experimental. The aggregate capacity of the plants will be about 660,000 gallons per year, and it is calculated that this year the factories will be able to absorb the product of 2,000-3,000 acres of potatoes. If the experiments prove successful, plant will be extended to produce about 4,000,000 gallons of alcohol per annum, which would meet about 10 per cent. of the petrol requirements of the Free State, and would require the produce of about 20,000 acres of potatoes to ensure such production of spirit. The alcohol would be blended with pure petrol. An increase in the cost of petrol is indicated should the scheme develop, and should the Government still continue its policy of a high tax on petrol.

SIR KINGSLEY WOOD, Minister of Health, is to open at the Science Museum, London, on October 2, an exhibition demonstrating the causes and effects of atmospheric pollution. The exhibition is expected to be the most comprehensive that has been held in this country. The exhibition, which will remain on view to the public until October 31, has been arranged by the National Smoke Abatement Society with the co-operation of interested Governmen Departments and industrial associations. Models and other exhibits demonstrating the efficient combustion of coal in steam-raising and other industrial operations will be shown, and other sections will be devoted to the uses of anthracite and anthracite coals, and oil. Another section will exhibit material relating to the generation, distribution, and uses of electricity. The pre-treatment of coal will be demonstrated by exhibits on high-temperature carbonisation for the preparation of town's gas and gas coke, and on low-temperature carbonisation, in which the product of principal interest is the semi-coke. The uses and control of gas, as a smokeless fuel, will be shown, and the properties of coke and semi-coke, both of which are smokeless, will be explained and their uses indicated. An exhibit of the Fuel Research Station will be concerned with current researches on the measurement of smoke. The instruments used, such as the deposit gauge, the automatic air filter, sulphur dioxide measurement apparatus, and light intensity measurement apparatus, will be exhibited.

Chemical and Allied Stocks and Shares

A SLOWING down of activity has been observable in the stock and share markets. Selling has not been reported to be strong, but developments in European political affairs are said to have affected sentiment and to have led to some diminution in demand.

Shares of chemical and kindred companies maintained a steady undertone. Imperial Chemical were, in fact, again unchanged on the week at 39s. 7½d. and B. Laporte remained at 130s. Salt Union was another steady feature, the price having kept around 43s. Boots Pure Drug have lost a few pence to 57s. 9d., and Timothy Whites and Taylors are also slightly lower at 30s. The market is continuing to budget for an increased dividend from the latter company. Greeff Chemicals Holdings were again active and well maintained at 9s., aided by the hope that before long it may be decided to pay an interim dividend on these 5s. shares. It may be recalled that they were issued at 7s. 6d. earlier in the year. The company's preference shares have made the rather higher pric of 12s. Borax consolidated deferred have declined rather sharply to 34s. Imperial Smelting were little changed at 15s. 10½d. Cooper, McDougall and Robertson were higher at 38s. 9d. on the interim dividend, and Fison, Packard and Prentice, although they reacted on the week to 45s. have remained more active, aided by continued market hopes of a moderately larger dividend, despite the increased capital now ranking.

Triplex Safety Glass were less active, although the statements at the recent annual meeting created a good impression in the market where the belief is generally held that there is probably scope for further large expansion in the company's profits. William Blythe 3s. shares were steady around 7s. 6d., aided by the maintenance of the interim dividend. British Glues were more active around 8s. 9d., and Midland Tar Distillers were reported to be firm at around 27s., aided by the possibility of a larger dividend. British Tar Products remained around 11s. 9d. awaiting the results. Tarmac ordinary shares at 36s. 3d. have more than held their recent further rise.

Distillers have gone back to 107s. 3d., a decline of 2s. on the week, but this is attributed to the rather less active general market conditions which have affected numerous prominent industrial shares and not to less favourable views as to the company's prospects. United Molasses continued active and, despite moderate fluctuations, are little changed on balance at 26s. 1½d. Cellon 5s. ordinary shares continued to receive a good deal of attention and at the time of writing have moved up further to 20s. 9d. United Glass Bottle Manufacturers made the higher price of 49s., a rise of 6d., there being a more general realisation that the market believes there are reasonable prospects of a further increase in the total dividend. Turner and Newall have gone back rather sharply to 95s. 7½d., but anticipations of an increase in dividend to 17½ per cent. remain current in the market.

General Refractories were steady, these 10s. shares having kept around 35s. Although most iron, steel and allied shares made somewhat lower prices. Stewarts and Lloyds have been maintained at 35s. 6d. Unilever were lower at 34s. 6d. South African Druggists came in for a good deal of attention around 13s. 10½d. Since the announcement of an interim dividend of 6 per cent. there has been a disposition in the market to revise dividend estimates up to 15 per cent. Associated Portland Cement benefited from the increase in the interim dividend to 7½ per cent. The latter may not indicate that a further increase in the total dividend is likely (last year 20 per cent. was paid), as it may arise from a desire to lessen the disparity between the interim and final payments, but the disposition in the market is to assume that some form of bonus may be possible in view of the conservative valuation placed in the accounts on the important interests in associated companies. The 10s. ordinary shares of Goodlass Wall and Lead Industries were again in larger demand and have moved up to 14s. at the time of writing. Although at the last meeting the chairman indicated that owing to the company's important interests abroad and overseas it has to contend with the difficult conditions ruling for international trade, the market is talking of an increase in the dividend from 6 per cent. to 7½ per cent., and also of the possibility that the payment of an interim dividend may perhaps be initiated this year. Leading oil shares have made rather lower prices this week, but this is attributed mainly to the less active general market conditions. There is a tendency to await the interim dividend decisions which fall to be announced next month. Some market men are hopeful that the Burmah Oil interim may be raised from 3¾ per cent. to 5 per cent., and there will be general disappointment if the "Shell" does not decide to resume payment of an interim dividend.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

Mortgages and Charges

(NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

MEDWAY SYNTHETIC PRODUCTS, LTD., Gillingham (Kent), manufacturers of chemicals, etc. (M., 19/9/36.) Sept. 2. £2,000 debentures; general charge.

County Court Judgments

(NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court Judgments against him.)

CARTER, CHAS. FREDK., 1 Pinner Park Avenue, Headstone Lane, Harrow, works chemist. (C.C., 19/9/36.) £26 2s. 2d. July 22.

Receivership

DRUG AND CHEMICAL CORPORATION, LTD. (R., 19/9/36.) Herbert Baron and Co., solicitors, of 9 Queen Victoria Street, E.C.4, were appointed receivers on September 3, under powers contained in mortgage dated September 29, 1931.

New Companies Registered

International Toxin Products, Ltd.—Registered September 4. Nominal capital £1,000. To acquire certain patents for inventions for improvements in or relating to the extraction of toxin from roots for the manufacture of insecticides, etc. A subscriber: Charles G. Mack, Manhattan, Balliol Road, Bootle.

West of Scotland Utilities, Ltd.—Registered in Edinburgh September 2. Nominal capital £6,000. Manufacturers and producers of oxygen, acetylene, nitrogen, hydrogen, coal gas, carbon dioxide, carbide and other elements, compounds or mixtures, etc. A subscriber: Robert A. Williamson, 3 Naseby Avenue, Broomhill, Glasgow, W.1.

New Chemical Trade Marks

Compiled from official sources by Gee and Co., patent and trade mark agents, Staple House, 51 and 52 Chancery Lane, London, W.C.2.

Polarwhite. 563,365. White china clays. English Clays Lovering Pochin and Co., Ltd., 14 High Cross Street, St. Austell, Cornwall. October 4, 1935.

Beckophene. 562,692. Artificial resins in powder or liquid form for use as ingredients in manufactures. Beck, Koller and Co. (England), Ltd., 479 Edge Lane, Liverpool. September 4, 1935.

Fantastex. 563,369. All goods included in Class 2. Bush, Beach and Gent, Ltd., Marlow House, Lloyd's Avenue, London, E.C.3. October 4, 1935.

Cotor. 560,404. Chemical substances for use in bleaching vegetable fibres in the course of manufacture. Ellis Jones and Co. (Stockport), Ltd., Tiviot Colour Works, Manchester Road, Stockport. May 24, 1935.

Demoloid. 563,241. Preparations for the prevention and removal of scale in steam boilers. Frederick Stanley Morton, trading as Morton International, 50-51 High Holborn, London, W.C.1. September 30, 1935.

Dicalite. 559,526. Diatomaceous earth, raw or partly prepared, for use in manufactures. The Dicalite Co., 756 South Broadway, Los Angeles, State of California. April 12, 1935. Address for Service in the United Kingdom is, c/o Frank B. Dehn and Co., Kingsway House, 103 Kingsway, London, W.C.2.

Company News

William Blythe and Co.—An interim payment is announced on the ordinary shares of 3 per cent., actual, less tax.

Venesta, Ltd.—A dividend of 3½ per cent., actual, less tax, is announced on the preference shares for the six months ending September 30, 1936.

Cheshire United Salt Co.—A dividend of 2½ per cent., less tax, is announced on the ordinary shares—the first since a similar payment in 1929—in respect of the year to end of June last. The directors have also declared the usual half-yearly payment of 2½ per cent., less tax, on the preferred ordinary shares for the six months to September 30 next, and it is proposed to recommend an additional payment of 2½ per cent. on account of the year ended June 30, 1936.

Indestructible Paint Co.—The directors announce that the results for the first six months of 1936 justify the maintenance of the interim dividend on the ordinary shares at 6¼ per cent. This will be paid, less tax, on October 8 to shareholders registered on September 21. Turnover to date shows increases in all markets compared with that of the corresponding period of last year. In the two preceding years, shareholders have received final dividends of 13¾ per cent., making 20 per cent.

United Steel Companies, Ltd.—The directors recommend a final dividend of 5 per cent., less tax, making, with the interim, a total of 7½ per cent. for the year ended June 30, 1936. The directors' report and accounts will be posted to members on Monday, September 28, and the dividend will be paid on October 31 to stockholders on the register on September 28. For 1934-35, the total distribution was 7 per cent., less tax, being made up of an interim of 2½ per cent. and a final of 4½ per cent., which compared with 5½ per cent. for the previous twelve months, when dividends were resumed.

British Drug Houses, Ltd.—The usual quarterly dividend of 1¼ per cent. has been declared on preference shares, payable on September 30.

A. Boake, Roberts and Co.—An interim of 2 per cent. net has been declared on the ordinary shares in respect of the year ending March 31, 1937, payable on September 15.

Thorncliffe Coal Distillation.—A profit of £54,935 is reported for the year ended June 30, 1936, after allowing for depreciation and tax, which compares with £54,950 for 1934-35. A sum of £26,288 was brought in, making a total of £81,223, against £75,062, and the directors propose paying a dividend of 3d. per share, or 25 per cent., on the ordinary shares. It is also proposed to transfer £10,000 to reserve, which leaves a balance of £15,344 to be carried forward. The last dividend on the 786,676 1s. ordinary shares was 66⅔ per cent. on account of 1923-24.

Lafarge Aluminous Cement.—The report for the year to end of March shows that trading profit amounted to £58,512 (£47,162); add sundry rents, receipts, etc., making £59,175. The general expenses take £19,193, debenture and loan interest £5,568, and directors' fees £1,100, and after allowing for audit and debenture trustees' fees, the net profit is £33,109. Add £971 brought in, making £34,080. To depreciation reserve is placed £33,000, bringing it to £56,000, leaving £1,080 to go forward. The directors propose that £56,000 standing at the credit of depreciation reserve be transferred in reducing book value of factory site, buildings, plant and machinery to £124,799. Since the end of the financial year capital reorganisation has been sanctioned. Since the end of the financial year the business has continued on a satisfactory scale, and it is proposed to pay, on October 1, six months' dividend on the preference shares.

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